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# ANNUAL REPORTS

OF THE

# DEPARTMENT OF THE INTERIOR

FOR THE

FISCAL YEAR ENDED JUNE 30, 1898.

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## NINETEENTH ANNUAL REPORT

OF THE

## UNITED STATES GEOLOGICAL SURVEY,

CHARLES D. WALCOTT, DIRECTOR.

## PART VI.

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# NINETEENTH ANNUAL REPORT

OF THE

# UNITED STATES GEOLOGICAL SURVEY

PART VI—MINERAL RESOURCES OF THE UNITED STATES, 1897
METALLIC PRODUCTS, COAL, AND COKE

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# LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF MINERAL RESOURCES,
*Washington, D. C., September 1, 1898.*

SIR: I have the honor to transmit the fourteenth annual report on the mineral resources of the United States. It bears the title Mineral Resources of the United States, 1897. As usual, it carries the statistical record of the mineral developments of this country to the end of the calendar year concerned, in this case to December 31, 1897, and contains in addition much descriptive matter collected while the statistical canvas was being finished. Much of the matter has found prompt publication in accordance with the law providing for the printing of each chapter as soon as completed.

In accordance with your instructions, the report for the calendar year 1898 is in preparation.

Very respectfully, your obedient servant.

DAVID T. DAY,
*Geologist in Charge.*

HON. CHARLES D. WALCOTT,
*Director of the United States Geological Survey.*

# MINERAL RESOURCES OF THE UNITED STATES, 1897.

DAVID T. DAY, *Chief of Division.*

## INTRODUCTION.

The scope and arrangement of the subjects in this volume are practically the same as in the thirteen volumes of the series, Mineral Resources of the United States, which have preceded it. The object of the volume is to record the developments in the mineral industries of the United States since the last report. The reports should be consulted together. Every chapter treated in this report, with the exception of the compilation of existing information concerning the mineral resources of Hawaii, is a census of the industry as complete as possible with the means at disposal. The statistics of the production of gold and silver are, as usual, the work of the Director of the Mint, Treasury Department, and are accepted as official. The statistics of the imports and exports of minerals, which form an essential part of this volume, are obtained through the courtesy of the Chief of the Bureau of Statistics, Treasury Department.

The following brief statement gives in condensed form the principal statistical information in the two volumes which make up this report.

## SUMMARY.

It will be noted that while the normal increase which we may expect in the total value of our mineral products is about $25,000,000 annually, the totals for the various years are markedly irregular. The total valuation for 1897 is $632,312,347, which is less than a normal increase, being only $8,575,621 greater than the mineral products of 1896, when the total value was $623,736,726. Nevertheless, this total for 1897 is the greatest in the history of the country, except that for 1892. It was reached owing to the remarkable increase over 1896 in the value of almost all of the important metallic products, especially pig iron, gold, copper, lead, and zinc. Copper and zinc reached their greatest production and value. Proportionately, aluminum made the largest increase, its product being more than three times that of 1896. The metallic products made a gain of $14,601,596 over 1896, while the nonmetallic

products fell off $6,025,975. The principal contributors to this decrease in value were petroleum and anthracite coal. On the other hand, bituminous coal, stone, natural gas, cement, and salt made notable advances in value.

## METALS.

*Iron and steel.*—The year 1897 proved to be a record breaker in the production of pig iron, 9,652,680 long tons being produced, as compared with 8,623,127 tons in 1896, an increase of 1,029,553 tons, or 11.94 per cent; and 9,446,308 tons in 1895, an increase of 206,372 tons, or 2.18 per cent. While the quantity of pig iron made in 1897 exceeded that of any previous year, the value was $95,122,299, or $10,076,251 less than the somewhat smaller product of 1895, when the total value was $105,198,550. In 1896 the value of the product was $90,250,000. The average price per ton has steadily declined in the last three years—from $11.14 in 1895 to $10.47 in 1896, and $9.85 in 1897. Bessemer steel ingots increased from 3,919,906 long tons in 1896 to 5,475,315 tons in 1897, a gain of 1,555,409 tons, or 39.68 per cent. The production of open-hearth steel ingots and castings increased from 1,298,700 tons in 1896 to 1,631,843 tons in 1897, an increase of 333,143 tons, or 25.65 per cent. The value of all Bessemer steel in the form of rails and billets in 1897 was $77,050,000; that of open-hearth steel in the form of billets was $24,275,000.

*Iron ores.*—The value of the iron ores produced in the United States in 1897 was $18,953,221, as compared with $22,788,069 in 1896. Although there was this considerable decrease in the value of the iron-ore product, the quantity increased from 16,005,449 long tons in 1896 to 17,518,046 long tons in 1897. The average price per ton in 1896 was $1.42, as compared with $1.09 in 1897.

*Gold.*—The gold product continued to increase, and in 1897 was valued at $57,363,000, as compared with $53,088,000 in 1896.

*Silver.*—The coining value of the silver product in 1897 was $69,637,172, or a commercial value of $32,316,000. In 1896 the coining value of the silver product was $76,069,236, or a commercial value of $39,655,000. This is a decrease in 1897 of $6,432,064 in the coining value and of $7,339,000 in the commercial value.

*Copper.*—The copper industry continues to be in a flourishing condition. The product in 1897 was 491,638,000 pounds, or 245,819 tons, valued at $54,080,180, the greatest product ever obtained in the United States. In 1896 the product was 460,061,430 pounds, valued at $49,456,603. The average price per pound in 1896 was 10.5 cents; in 1897 it was 11 cents.

*Lead.*—The lead product also increased from 188,000 short tons in 1896 to 212,000 tons in 1897, which is the largest product ever attained in this country. The value also increased from $10,528,000 in 1896 to $14,885,728 in 1897.

*Zinc.*—This product also contributed to the general increase in the value of the metallic products of the United States in 1897. In 1896 the product was 81,499 short tons, valued at $6,519,920; in 1897 it was 99,980 tons, valued at $8,498,300.

*Quicksilver.*—The product declined from 30,765 flasks in 1896, worth $1,075,449, to 26,648 flasks in 1897, worth $993,145. The industry is confined practically to California. The Texas deposit is still undeveloped.

*Aluminum.*—The product of aluminum and the variety of its uses continue to increase. In 1896 the product was 1,300,000 pounds; in 1897 it increased over threefold, or to 4,000,000 pounds. The value increased from $520,000 in 1896 to $1,500,000 in 1897.

*Nickel.*—The product of the United States continues to be derived as a by-product, and, while small, showed a slight increase in 1897. In 1896 the product was 17,170 pounds, worth $4,464; in 1897 it was 23,707 pounds, valued at $7,823. The Canadian mines continue to furnish the principal supply.

*Platinum.*—The product was 150 ounces, worth $900, in 1897, as compared with 163 ounces in 1896, valued at $944.

*Manganese ore.*—The product of manganese increased slightly, or from 10,088 long tons in 1896, valued at $90,927, to 11,108 tons in 1897, worth $95,505.

*Antimony.*—The total amount of metallic antimony produced in 1897 was 756 short tons, having a value of $109,655, as compared with 601 short tons in 1896, worth $84,290. A large portion of the product was from foreign ores smelted in New Jersey. The amount of antimony ore, or stibnite, mined in the United States during the year was 489 short tons, valued at $8,864.

## FUELS.

*Coal.*—The total product of coal in 1897 amounted to 178,769,344 long tons, equivalent to 200,221,665 short tons, as compared with 171,416,390 long tons, or 191,986,357 short tons in 1896. The production in 1897 was the largest ever attained, the product last year in short tons exceeding 200,000,000 for the first time in our history. The production of anthracite coal in Pennsylvania showed a decrease of 1,709,213 long tons as compared with 1896, and of 4,971,048 long tons as compared with the product of 1895, which was the year of maximum production for anthracite coal. It follows, therefore, that the entire increase in the total production of coal in 1897 was in the output of bituminous coal, which increased from 122,893,104 long tons, or 137,640,276 short tons, in 1896, to 131,955,270 long tons, or 147,789,902 short tons, in 1897. The increase in the bituminous product was, therefore, 9,062,074 long tons, or 10,149,626 short tons, and made a net increase in the total product of coal in 1897 of 7,352,954 long tons, or 8,235,308 short tons. The net increase in the value of the product in

1897 as compared with 1896 was $2,229,012, the difference being an increase of $4,848,537 in the value of the bituminous product and a decrease of $2,619,525 in the value of the anthracite product. The total value of the product obtained in 1897 was $198,869,178, against a total value in 1896 of $196,640,166. This was divided as follows: Anthracite value in 1897, $79,129,126; in 1896, $81,748,651; bituminous value in 1897, $119,740,052; in 1896, $114,891,515. The product of bituminous coal in all cases includes a small amount of anthracite coal produced in Colorado and New Mexico; also semianthracite mined in Arkansas and Virginia, the liguite coals of Colorado, North Dakota, California, Oregon, and Texas, and semibituminous, cannel, splint, and block coals.

A study of the conditions which affected the coal-mining industry in 1897 reveals the fact that the higher prices of anthracite coal which prevailed during the last two years, and which have been due to a cooperation among the producers for the purpose of restricting production and maintaining prices, have resulted in the adoption by large consumers of other kinds of fuel. Bituminous coal is, with the use of smoke-consuming furnaces, superseding anthracite coal for steam raising. Iron furnaces formerly using anthracite coal, or a mixture of anthracite coal and coke, are substituting coke or a mixture of bituminous coal and coke, and the use in kitchen ranges and household furnaces of prepared sizes of coke is increasing. The use of gas for domestic purposes, particularly in summer, is also increasing. Anthracite producers in 1897 were successful in maintaining prices, the average per ton for the year being $1.85, which was the same as that which obtained during 1896. The price of bituminous coal, on the other hand, was somewhat lower, and continues an uninterrupted succession of lower annual prices since 1887. The average price for all coals included in the bituminous product was 81 cents in 1897, against 83 cents in 1896 and $1.12 in 1887. In arriving at the average price of anthracite coal, only the marketed product is considered. The amount consumed at the collieries, which consists usually of culm or slack, an otherwise wasted product, is excluded from the value. The value of the bituminous coal includes all sizes, for, while the colliery consumption usually consists of slack coal, it has a market value.

*Coke.*—Stimulated by a year of exceptional activity in the iron and steel industries of the United States, the production of coke increased from 11,788,773 short tons in 1896 to 13,288,984 short tons in 1897. While this was an increase of a little over 1,500,000 tons as compared with 1896, it was about 45,000 tons less than the product in 1895, which was, in coke production as in the production of anthracite coal, the year of maximum output. The value of the coke product in 1897 was only $440,000 more than that of 1896, the proportionately higher value in the former year being due to higher prices set by the larger producers of Connellsville coke. Early in the year the large concerns in the

Connellsville region put the prices of their product at $2 per ton for furnace, $2.30 for foundry, and $2.35 for crushed, and maintained these prices throughout the year. The average price per ton realized for the entire coke product of 1896 was $1.837; in 1897 the average price per ton was $1.663.

*Petroleum.*—The product decreased slightly, from 60,960,361 barrels of 42 gallons each in 1896 to 60,568,081 barrels in 1897. The remarkable feature of the petroleum industry throughout the year was the break in prices, resulting in a decrease in the total value from $58,518,709 to $40,929,611, a loss of practically 30 per cent.

*Natural gas.*—The product of natural gas continued to decrease, but the higher prices set by producers for their product caused the total value in 1897 to show a slight increase over the total value in 1896, the figures for the two years being, respectively, $13,002,512 and $13,826,422.

## STRUCTURAL MATERIALS.

*Stone.*—The total value of stone of all kinds increased from $31,346,171 in 1896 to $36,070,651 in 1897. The export of slate continued to be one of the leading features of the trade, notwithstanding the settlement of the strikes in the slate-quarrying region of Wales. The continued increased demand for the more highly finished products of the stone quarries remained a feature of the year.

*Clays.*—There was a slight decline in the general volume of the clay industry. In 1896 the value of the brick clays aggregated about $9,000,000 in the crude state, and that of other clays $800,000. In 1897 the brick clays were valued, in the crude state, at about $8,000,000, and all other clays at about $1,000,000. The total value of wares made from clay in 1897 was $60,911,641; in 1896 it was $62,528,963.

*Cement.*—Natural-rock cement continued to increase. In 1896 the product was 7,970,450 barrels (of 300 pounds each), worth $4,049,202; in 1897 it was 8,311,688 barrels, worth $3,862,392. It will be noted that in spite of the increased output the value declined slightly. The increase in the Portland-cement product was much more marked—from 1,543,023 barrels in 1896, worth $2,424,011, to 2,677,775 barrels, worth $4,315,891, in 1897. The number of Portland-cement works increased from 26 to 29.

## ABRASIVE MATERIALS.

*Millstones.*—The value of the product in 1897 showed a slight increase over that of 1896, and although amounting altogether to only $25,932, was the largest value reported since 1889. The value of millstones produced in 1896 amounted to $22,567, indicating an increase in 1897 of $3,365. Millstones of domestic production are used chiefly for grinding paint ores, cement rock, and the coarser cereals. Their use in flouring mills has been superseded by the roller process.

*Grindstones.*—The product was the largest in any year since 1891, being valued at $368,058, an increase of $41,232 over the value of the product in 1896, and exceeding the value of grindstones produced in 1895 by over 75 per cent.

*Corundum and emery.*—The production of corundum and emery has shown very little change in the last three years, the quantity mined in 1897 amounting to 2,165 short tons, against 2,120 short tons in 1896 and 2,102 short tons in 1895. The value of the product in 1897 was $106,574, a decrease from 1896 of $6,672, and an increase compared with 1895 of $318.

*Oilstones.*—The value of this class of abrasives produced in the United States in 1897 was $149,970, against a value of $127,098 in 1896. The production is practically controlled by one concern.

*Infusorial earth.*—Including the product of tripoli from Virginia, the output of infusorial earth in 1897 was 3,833 short tons, valued at $22,835, against 3,846 short tons, valued at $26,792, in 1896.

*Garnet.*—Abrasive garnet produced in the United States in 1897 amounted to 2,554 short tons, valued at $80,853, a slight decrease in quantity and an increase in value as compared with 1896.

*Pumice stone.*—A commercial product of this material is reported for the first time in 1897, the total output amounting to 158 tons, which was shipped to Chicago for preparation for market.

## CHEMICAL MATERIALS.

*Phosphate rock.*—The development of phosphate-rock mines in Tennessee was active during 1897, and the product from that State amounted to 128,723 long tons. Florida produced 552,342 long tons, and South Carolina 267,380 long tons of land rock and 90,900 long tons of river rock. The total product for the United States amounted to 1,039,345 long tons, an increase of nearly 100,000 tons over the product of 1896, but less than 1,000 tons in excess of the product in 1895. Prices continue to decline, the value of the product in 1897 being $2,673,202, against a value of $2,803,372 for the smaller product in 1896.

*Gypsum.*—The product of crude gypsum in 1897 amounted to 288,982 short tons, as compared with 224,254 short tons in 1896. The product in 1897 was the largest on record, and that in 1896 was the smallest in six years. Taking the value of the material in the condition in which it was first sold, the product in 1897 was worth $755,864, an increase of $182,520 over 1896, but less than the value in 1894 and in 1895.

*Salt.*—The production of salt in 1897 was phenominally large, amounting to 15,973,202 barrels of 280 pounds, as compared with 13,850,726 barrels in 1896. The value of the product increased $879,181—from $4,040,839 in 1896 to $4,920,020 in 1897. The average price per barrel received by producers, exclusive of the cost of package, in both years was 30 cents, a fraction over 10 cents for 100 pounds. An agreement

was effected among the producers in Michigan to uphold prices, with the result that the average for the State advanced from 22.7 cents in 1896 to 31.4 cents in 1897, but this was not sufficient to effect an increase in the average price for the entire salt product.

*Bromine.*—The industry continues in the hands of the sales syndicate, the product in 1897 being 487,149 pounds, with a value at the works of $129,094, a decrease from the product of 546,580 pounds, valued at $144,501, in 1896. This product includes the bromine in potassium bromide made directly.

*Sulphur.*—The product decreased in 1897, owing to the works in Louisiana being shut down the greater part of the year. The total output in 1897 was 2,275 short tons, only 43 per cent of the amount produced in 1896, when the product amounted to 5,260 short tons. The value declined from $87,200 in 1896 to $45,590 in 1897.

*Pyrites.*—The substitution of pyrites for sulphur in the manufacture of sulphuric acid is on the increase. The production of iron pyrites for acid manufacture in 1897 amounted to 143,201 long tons, against 115,483 tons in 1896, making the largest output ever recorded. The value advanced from $320,163 in 1896 to $391,541 in 1897.

*Borax.*—The product in 1897 amounted to 16,000,000 pounds, valued at $1,080,000, an increase from 13,508,000 pounds, worth $675,400 in 1896.

*Fluorspar.*—The product shows a decrease from 6,500 short tons, valued at $52,000 in 1896, to 5,062 short tons, valued at $37,159 in 1897.

## PIGMENTS.

*Metallic paint.*—The product, exclusive of mortar colors, increased from 14,805 short tons, valued at $180,134 in 1896, to 16,699 short tons, valued at $187,694 in 1897. The production of mortar colors decreased from 9,660 in 1896 to 8,237 short tons in 1897.

*Ocher, umber, and sienna.*—The production of ocher decreased slightly, from 14,074 short tons in 1896 to 14,006 short tons in 1897. The value increased from $136,458 to $162,764. The production of umber increased from 165 to 480 short tons, and the production of sienna from 395 to 620 short tons, with proportionate increase in value.

*Venetian red.*—The production of 1897 was more than three times that of 1896, the phenominal increase being due to the bringing in of a large product from Illinois, which is reported as a source of supply for the first time in 1897.

*Zinc white.*—The use of zinc white as a base for white and color pigments is increasing, the production in 1897 amounting to 25,000 short tons, worth $1,750,000, an increase of 25 per cent over 1896. Prices remained steady.

*Barytes.*—The production in 1897 increased a little more than 50 per cent over that of 1896, amounting to 26,042 short tons, against 17,068

short tons the previous year. The value increased 25 per cent—from $46,513 to $58,295.

*Cobalt oxide.*—The product increased from 10,700 pounds, worth $15,301 in 1896 to 19,520 pounds, worth $31,232 in 1897.

## MISCELLANEOUS.

*Fuller's earth.*—This product continues to come practically entirely from Florida, the beds in Georgia noted in the last report having not yet been developed. The product in 1897 was 17,113 short tons, valued at $112,272, as compared with 9,872 short tons in 1896, worth $59,360.

*Precious stones.*—The product increased 33.54 per cent, or from $97,850 in 1896 to $130,675 in 1897. The principal features of the year were the increased output of sapphires from Montana, the development of turquoise deposits in New Mexico, Arizona, California, and Nevada, and the finding of large quantities of gigantic quartz crystals at Mokelumne Hill, California. The importation of diamonds also increased markedly upon the reduction of the import duties.

*Mica.*—The amount of sheet mica produced in 1897 exceeded that of any year since 1885, aggregating 82,676 pounds. To this should be added 740 tons of scrap mica, ground for manufacture into lubricants, wall papers, boiler covering, etc. The value of the sheet mica produced in 1897 was $80,774, and that of the scrap mica $14,452, a total of $95,226. In 1896 the value of the scrap mica was $1,750 and of sheet mica $65,441, a total of $67,191.

*Feldspar.*—The product increased from 9,114 long tons in 1896, worth $35,200, to 11,175 tons in 1897, worth $43,100.

*Flint.*—This is chiefly quartz, ground for potters' use. The product increased from 11,124 long tons in 1896, valued at $24,226, to 11,952 tons in 1897, valued at $26,227.

*Asphaltum.*—The product in 1897 amounted to 75,945 short tons, valued at $664,632, against 80,503 short tons in 1896, worth $577,563. It will be noted by this that while the output in 1897 decreased 4,558 tons, the value not only showed a marked increase ($87,069), but reached the highest figure ever recorded.

*Asbestos.*—The product showed a slight increase, from 504 short tons in 1896, valued at $6,100, to 580 tons in 1897, valued at $6,450. The Canadian deposits continue to supply by far the larger part of this material used in the United States.

*Magnesite.*—This product comes entirely from California. It was 1,143 short tons in 1897, worth $13,671. In 1896 the product was 1,500 tons, worth $11,000.

*Graphite.*—The production during 1897 amounted to 1,254,402 pounds of crystalline and refined plumbago, and 1,108 short tons of amorphous graphite and graphitic coal. The value of these products was, respectively, $43,099 and $11,178. In 1896 the product of crystalline plum-

bago was 535,858 pounds, and of the amorphous variety 760 short tons. The total value of both these varieties in 1896 was $48,460.

*Soapstone.*—In 1897 the product was 21,923 short tons, worth $365,629, against 22,183 tons in 1896, valued at $354,065. The product of fibrous talc increased from 46,089 short tons in 1896, valued at $399,443, to 57,009 short tons in 1897, worth $396,936.

*Mineral waters.*—The quantity of mineral waters sold continued to decline, there being 23,255,911 gallons sold in 1897 and 25,795,312 gallons in 1896. Nevertheless, the value of the product increased from $4,136,192 in 1896 to $4,599,106 in 1897.

*Limestone for iron flux.*—This product gained slightly, or from 4,120,102 long tons in 1896, valued at $2,060,000, to 4,247,688 long tons in 1897, worth $2,124,000.

*Bauxite.*—The product increased slightly, from 18,364 long tons in 1896, worth $47,338, to 20,590 long tons in 1897, valued at $57,652.

*Monazite.*—The product of monazite, which came entirely from North Carolina, increased from 30,000 pounds in 1896 to 44,000 pounds in 1897, while the value increased from $1,500 in 1896 to $1,980 in 1897.

*Metallic products of the United States in 1897.*

| Product. | Quantity. | Value. |
|---|---|---|
| Pig iron, value at Philadelphia..long tons.. | 9,652,680 | $95,122,299 |
| Silver, coining value.....troy ounces.. | 53,860,000 | 69,637,172 |
| Gold, coining value.....do.... | 2,774,935 | 57,363,000 |
| Copper, value at New York City..pounds.. | 491,638,000 | 54,080,180 |
| Lead, value at New York City..short tons.. | 212,000 | 14,885,728 |
| Zinc, value at New York City.....do.... | 99,980 | 8,498,300 |
| Quicksilver, value at San Francisco..flasks.. | 26,648 | 993,445 |
| Aluminum, value at Pittsburg....pounds.. | 4,000,000 | 1,500,000 |
| Antimony, value at New York City, short tons..... | 756 | 109,655 |
| Nickel, value at Philadelphia.... pounds.. | 23,707 | 7,823 |
| Platinum (crude), value at San Francisco, troy ounces..... | 150 | 900 |
| Total..... | ..... | 302,198,502 |

*Nonmetallic products of the United States in 1897.*

| Product. | Quantity. | Value. |
|---|---|---|
| Bituminous coal ..... short tons.. | 147,789,902 | $119,740,052 |
| Pennsylvania anthracite ..... long tons.. | 46,814,074 | 79,129,126 |
| Building stone ..... | ..... | 36,070,651 |
| Petroleum ..... barrels.. | 60,568,081 | 40,929,611 |
| Natural gas ..... | ..... | 13,826,422 |
| Brick clay ..... | ..... | 8,000,000 |
| Clay, all other than brick ..... long tons.. | ..... | 1,000,000 |
| Cement ..... barrels.. | 10,989,463 | 8,178,283 |
| Mineral waters ..... gallons sold.. | 23,255,911 | 4,599,106 |
| Phosphate rock ..... long tons.. | 1,039,345 | 2,673,202 |
| Salt ..... barrels.. | 15,973,202 | 4,920,020 |
| Limestone for iron flux ..... long tons.. | 4,247,688 | 2,124,000 |
| Zinc white ..... short tons.. | 25,000 | 1,750,000 |
| Gypsum ..... do.... | 288,982 | 755,864 |
| Borax ..... pounds.. | 16,000,000 | 1,080,000 |
| Mineral paints ..... short tons.. | 60,913 | 795,793 |
| Grindstones ..... | ..... | 368,058 |
| Fibrous talc ..... short tons.. | 57,009 | 396,936 |
| Asphaltum ..... do.... | 75,945 | 664,632 |
| Soapstone ..... do.... | 21,923 | 365,629 |
| Precious stones ..... | ..... | 130,675 |
| Pyrites ..... long tons.. | 143,201 | 391,541 |
| Corundum and emery ..... short tons.. | 2,165 | 106,574 |
| Oilstones, etc ..... | ..... | 149,970 |
| Garnet for abrasive purposes .. short tons.. | 2,554 | 80,853 |
| Mica (sheet) ..... pounds.. | 82,676 | 80,774 |
| Mica (scrap) ..... short tons.. | 740 | 14,452 |
| Barytes (crude) ..... long tons.. | 26,042 | 58,295 |
| Bromine ..... pounds.. | 487,149 | 129,094 |
| Fluorspar ..... short tons.. | 5,062 | 37,159 |
| Feldspar ..... long tons.. | 11,175 | 43,100 |
| Manganese ore ..... do.... | 11,108 | 95,505 |
| Flint ..... do.... | 11,952 | 26,227 |
| Monazite ..... pounds.. | 44,000 | 1,980 |
| Graphite (crystalline) ..... do.... | 1,254,402 | 43,099 |
| Graphite (amorphous) ..... short tons.. | 1,108 | 11,178 |
| Bauxite ..... long tons.. | 20,590 | 57,652 |
| Sulphur ..... short tons.. | 2,275 | 45,590 |
| Fullers earth ..... do.... | 17,113 | 112,272 |
| Marls ..... do.... | 60,000 | 30,000 |
| Infusorial earth and tripoli ..... do.... | 3,833 | 22,835 |
| Millstones ..... | ..... | 25,932 |

*Nonmetallic products of the United States in 1897*—Continued.

| Product. | Quantity. | Value. |
|---|---|---|
| Chromic iron ore ..... long tons.. | None. | None. |
| Cobalt oxide ..... pounds.. | 19,520 | 31,232 |
| Magnesite ..... short tons.. | 1,143 | 13,671 |
| Asbestos ..... do.... | 580 | 6,450 |
| Rutile ..... pounds.. | 100 | 350 |

*Résumé of the mineral products of the United States in 1897.*

| | |
|---|---|
| Total value of nonmetallic mineral products | $329,113,845 |
| Total value of metallic products | 302,198,502 |
| Estimated value of mineral products unspecified | 1,000,000 |
| Grand total | 632,312,347 |

*Mineral products of the United States*

| | Product. | 1880. | |
|---|---|---|---|
| | | Quantity. | Value. |
| | METALLIC. | | |
| 1 | Pig iron, value at Philadelphia ..... long tons.. | 3,375,912 | $89,315,569 |
| 2 | Silver, coining value ..... troy ounces.. | 30,320,000 | 39,200,000 |
| 3 | Gold, coining value ..... do.... | 1,741,500 | 36,000,000 |
| 4 | Copper, value at New York City ..... pounds.. | 60,480,000 | 11,491,200 |
| 5 | Lead, value at New York City ..... short tons.. | 97,825 | 9,782,500 |
| 6 | Zinc, value at New York City ..... do.... | 23,239 | 2,277,432 |
| 7 | Quicksilver, value at San Francisco ..... flasks.. | 59,926 | 1,797,780 |
| 8 | Nickel, value at Philadelphia ..... pounds.. | 329,968 | 164,984 |
| 9 | Aluminum, value at Pittsburg ..... do.... | ..... | ..... |
| 10 | Antimony, value at San Francisco .... short tons.. | 50 | 10,000 |
| 11 | Platinum (crude), value at San Francisco, troy ounces ..... | 100 | 400 |
| 12 | Total value of metallic products ..... | ..... | 190,039,865 |
| | NONMETALLIC (spot values). | | |
| 13 | Bituminous coal ..... long tons.. | 38,242,641 | 53,443,718 |
| 14 | Pennsylvania anthracite ..... do.... | 25,580,189 | 42,196,678 |
| 15 | Building stone ..... | ..... | 18,356,055 |
| 16 | Petroleum ..... barrels.. | 26,286,123 | 24,183,233 |
| 17 | Lime ..... do.... | 28,000,000 | 19,000,000 |
| 18 | Natural gas ..... | ..... | ..... |
| 19 | Cement ..... barrels.. | 2,072,943 | 1,852,707 |
| 20 | Salt ..... do.... | 5,961,060 | 4,829,566 |
| 21 | Phosphate rock ..... long tons.. | 211,377 | 1,123,823 |
| 22 | Limestone for iron flux ..... do.... | 4,500,000 | 3,800,000 |
| 23 | Mineral waters ..... gallons sold.. | 2,000,000 | 500,000 |
| 24 | Zinc white ..... short tons.. | 10,107 | 763,738 |
| 25 | Potters' clay ..... long tons.. | 25,783 | 200,457 |
| 26 | Mineral paints ..... short tons.. | 3,604 | 135,840 |
| 27 | Borax ..... pounds.. | 3,692,443 | 277,233 |
| 28 | Gypsum ..... short tons.. | 90,000 | 400,000 |
| 29 | Grindstones ..... | ..... | 500,000 |
| 30 | Fibrous talc ..... short tons.. | 4,210 | 54,730 |
| 31 | Pyrites ..... long tons.. | 2,000 | 5,000 |
| 32 | Soapstone ..... short tons.. | 8,441 | 66,665 |
| 33 | Manganese ore ..... long tons.. | 5,761 | 86,415 |
| 34 | Asphaltum ..... short tons.. | 444 | 4,440 |
| 35 | Precious stones ..... | ..... | 100,000 |
| 36 | Bromine ..... pounds.. | 404,690 | 114,752 |
| 37 | Corundum ..... short tons.. | 1,044 | 29,280 |
| 38 | Barytes (crude) ..... long tons.. | 20,000 | 80,000 |
| 39 | Graphite ..... pounds.. | ..... | 49,800 |
| 40 | Millstones ..... | ..... | 200,000 |
| 41 | Oilstones, etc. *a* ..... pounds.. | 420,000 | 8,000 |
| 42 | Marls ..... short tons.. | 1,000,000 | 500,000 |
| 43 | Flint ..... long tons.. | 20,000 | 80,000 |
| 44 | Fluorspar ..... short tons.. | 4,000 | 16,000 |
| 45 | Chromic iron ore ..... long tons.. | 2,288 | 27,808 |
| 46 | Infusorial earth ..... short tons.. | 1,833 | 45,660 |
| 47 | Feldspar ..... long tons.. | 12,500 | 60,000 |
| 48 | Mica ..... pounds.. | 81,669 | 127,825 |
| 49 | Cobalt oxide ..... do.... | 7,251 | 24,000 |
| 50 | Slate ground as a pigment ..... short tons.. | 1,000 | 10,000 |
| 51 | Sulphur ..... do.... | 600 | 21,000 |
| 52 | Asbestos ..... do.... | 150 | 4,312 |
| 53 | Rutile ..... pounds.. | 100 | 400 |
| 54 | Lithographic stone ..... short tons.. | ..... | ..... |
| 55 | Total value of nonmetallic mineral products. | ..... | 173,279,135 |
| 56 | Total value of metallic products ..... | ..... | 190,039,865 |
| 57 | Estimated value of mineral products unspecified.. | ..... | 6,000,000 |
| 58 | Grand total ..... | ..... | 369,319,000 |

*a* Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

*for the calendar years 1880 to 1896.*

| 1881. | | 1882. | | 1883. | | |
|---|---|---|---|---|---|---|
| Quantity. | Value. | Quantity. | Value. | Quantity. | Value. | |
| 4,144,254 | $87,029,334 | 4,623,323 | $106,336,429 | 4,595,510 | $91,910,200 | 1 |
| 33,077,000 | 43,000,000 | 36,197,695 | 46,800,000 | 35,733,622 | 46,200,000 | 2 |
| 1,676,300 | 34,700,000 | 1,572,186 | 32,500,000 | 1,451,249 | 30,000,000 | 3 |
| 71,680,000 | 12,175,600 | 91,646,232 | 16,038,091 | 117,151,795 | 18,064,807 | 4 |
| 117,085 | 11,240,160 | 132,890 | 12,624,550 | 143,957 | 12,322,719 | 5 |
| 26,800 | 2,680,000 | 33,765 | 3,646,620 | 36,872 | 3,311,106 | 6 |
| 60,851 | 1,764,679 | 52,732 | 1,487,042 | 46,725 | 1,253,632 | 7 |
| 265,668 | 292,235 | 281,616 | 309,777 | 58,800 | 52,920 | 8 |
| ..... | ..... | ..... | ..... | 83 | 875 | 9 |
| 50 | 10,000 | 60 | 12,000 | 60 | 12,000 | 10 |
| 100 | 400 | 200 | 600 | 200 | 600 | 11 |
| ..... | 192,892,408 | ..... | 219,755,109 | ..... | 203,128,859 | 12 |
| 48,179,475 | 60,224,344 | 60,861,190 | 76,076,487 | 68,531,500 | 82,237,800 | 13 |
| 28,500,016 | 64,125,036 | 31,358,264 | 70,556,094 | 34,336,469 | 77,257,055 | 14 |
| ..... | 20,000,000 | ..... | 21,000,000 | ..... | 20,000,000 | 15 |
| 27,661,238 | 25,448,339 | 30,510,830 | 24,065,988 | 23,449,633 | 25,790,252 | 16 |
| 30,000,000 | 20,000,000 | 31,000,000 | 21,700,000 | 32,000,000 | 19,200,000 | 17 |
| ..... | ..... | ..... | 215,000 | ..... | 475,000 | 18 |
| 2,500,000 | 2,000,000 | 3,250,000 | 3,672,750 | 4,190,000 | 4,293,500 | 19 |
| 6,200,000 | 4,200,000 | 6,412,373 | 4,320,140 | 6,192,231 | 4,211,042 | 20 |
| 266,734 | 1,980,259 | 332,077 | 1,992,462 | 378,380 | 2,270,280 | 21 |
| 6,000,000 | 4,100,000 | 3,850,000 | 2,310,000 | 3,814,273 | 1,907,136 | 22 |
| 3,700,000 | 700,000 | 5,000,000 | 800,000 | 7,529,423 | 1,119,603 | 23 |
| 10,000 | 700,000 | 10,000 | 700,000 | 12,000 | 840,000 | 24 |
| 25,000 | 200,000 | 30,000 | 240,000 | 32,000 | 250,000 | 25 |
| 6,000 | 100,000 | 7,000 | 105,000 | 7,000 | 84,000 | 26 |
| 4,046,000 | 304,461 | 4,236,291 | 338,903 | 6,500,000 | 585,000 | 27 |
| 85,000 | 350,000 | 100,000 | 450,000 | 90,000 | 420,000 | 28 |
| ..... | 500,000 | ..... | 700,000 | ..... | 600,000 | 29 |
| 5,000 | 60,000 | 6,000 | 75,000 | 6,000 | 75,000 | 30 |
| 10,000 | 60,000 | 12,000 | 72,000 | 25,000 | 137,500 | 31 |
| 7,000 | 75,000 | 6,000 | 90,000 | 8,000 | 150,000 | 32 |
| 4,895 | 73,425 | 4,532 | 67,980 | 6,155 | 92,325 | 33 |
| 2,000 | 8,000 | 3,000 | 10,500 | 3,000 | 10,500 | 34 |
| ..... | 110,000 | ..... | 150,000 | ..... | 207,050 | 35 |
| 300,000 | 75,000 | 250,000 | 75,000 | 301,100 | 72,264 | 36 |
| 500 | 80,000 | 500 | 80,000 | 550 | 100,000 | 37 |
| 20,000 | 80,000 | 20,000 | 80,000 | 27,000 | 108,000 | 38 |
| 400,000 | 30,000 | 425,000 | 34,000 | 575,000 | 46,000 | 39 |
| ..... | 150,000 | ..... | 200,000 | ..... | 150,000 | 40 |
| 500,000 | 8,580 | 600,000 | 10,000 | 600,000 | 10,000 | 41 |
| 1,000,000 | 500,000 | 1,080,000 | 540,000 | 972,000 | 486,000 | 42 |
| 25,000 | 100,000 | 25,000 | 100,000 | 25,000 | 100,000 | 43 |
| 4,000 | 16,000 | 4,000 | 20,000 | 4,000 | 20,000 | 44 |
| 2,000 | 30,000 | 2,500 | 50,000 | 3,000 | 60,000 | 45 |
| 1,000 | 10,000 | 1,000 | 8,000 | 1,000 | 5,000 | 46 |
| 14,000 | 70,000 | 14,000 | 70,000 | 14,100 | 71,112 | 47 |
| 100,000 | 250,000 | 100,000 | 250,000 | 114,000 | 285,000 | 48 |
| 8,280 | 25,000 | 11,653 | 32,046 | 1,096 | 2,795 | 49 |
| 1,000 | 10,000 | 2,000 | 24,000 | 2,000 | 24,000 | 50 |
| 600 | 21,000 | 600 | 21,000 | 1,000 | 27,000 | 51 |
| 200 | 7,000 | 1,200 | 36,000 | 1,000 | 30,000 | 52 |
| 200 | 700 | 500 | 1,800 | 550 | 2,000 | 53 |
| 50 | 1,000 | ..... | ..... | ..... | ..... | 54 |
| ..... | 206,783,144 | ..... | 231,340,150 | ..... | 243,812,214 | 55 |
| ..... | 192,892,408 | ..... | 219,755,109 | ..... | 203,128,859 | 56 |
| ..... | 6,500,000 | ..... | 6,500,000 | ..... | 6,500,000 | 57 |
| ..... | 406,175,552 | ..... | 457,595,259 | ..... | 453,441,073 | 58 |

*Mineral products of the United States for*

| | Product. | 1884. | |
|---|---|---|---|
| | | Quantity. | Value. |
| | METALLIC. | | |
| 1 | Pig iron, value at Philadelphia.....long tons.. | 4,097,868 | $73,761,624 |
| 2 | Silver, coining value.....troy ounces.. | 37,744,605 | 48,800,000 |
| 3 | Gold, coining value.....do.... | 1,489,949 | 30,800,000 |
| 4 | Copper, value at New York City .....pounds.. | 145,221,934 | 17,789,687 |
| 5 | Lead, value at New York City.....short tons.. | 139,897 | 10,537,042 |
| 6 | Zinc, value at New York City.....do.... | 38,544 | 3,422,707 |
| 7 | Quicksilver, value at San Francisco.....flasks.. | 31,913 | 936,327 |
| 8 | Nickel, value at Philadelphia.....pounds.. | 64,550 | 48,412 |
| 9 | Aluminum, value at Pittsburg.....do.... | 150 | 1,350 |
| 10 | Antimony, value at San Francisco....short tons.. | 60 | 12,000 |
| 11 | Platinum (crude), value at San Francisco, troy ounces..... | 150 | 450 |
| 12 | Total value of metallic products..... | ..... | 186,109,599 |
| | NONMETALLIC (spot values). | | |
| 13 | Bituminous coal.....long tons.. | 73,730,539 | 77,417,066 |
| 14 | Pennsylvania anthracite .....do.... | 33,175,756 | 66,351,512 |
| 15 | Building stone ..... | ..... | 19,000,000 |
| 16 | Petroleum.....barrels.. | 24,218,438 | 20,595,966 |
| 17 | Lime .....do.... | 37,000,000 | 18,500,000 |
| 18 | Natural gas ..... | ..... | 1,460,000 |
| 19 | Brick clay..... | ..... | ..... |
| 20 | Clay (all other than brick).....long tons.. | 35,000 | 270,000 |
| 21 | Cement .....barrels.. | 4,000,000 | 3,720,000 |
| 22 | Salt .....do.... | 6,514,937 | 4,197,734 |
| 23 | Phosphate rock.....long tons.. | 431,779 | 2,374,784 |
| 24 | Limestone for iron flux.....do.... | 3,401,930 | 1,700,965 |
| 25 | Mineral waters .....gallons sold.. | 10,215,328 | 1,459,143 |
| 26 | Zinc white .....short tons.. | 13,000 | 910,000 |
| 27 | Mineral paints .....do.... | 7,000 | 84,000 |
| 28 | Borax .....pounds.. | 7,000,000 | 490,000 |
| 29 | Gypsum .....short tons.. | 90,000 | 390,000 |
| 30 | Grindstones ..... | ..... | 570,000 |
| 31 | Fibrous talc.....short tons.. | 10,000 | 110,000 |
| 32 | Pyrites.....long tons.. | 35,000 | 175,000 |
| 33 | Soapstone .....short tons.. | 10,000 | 200,000 |
| 34 | Manganese ore .....long tons.. | 10,180 | 122,160 |
| 35 | Asphaltum .....short tons.. | 3,000 | 10,500 |
| 36 | Precious stones..... | ..... | 222,975 |
| 37 | Bromine .....pounds.. | 281,100 | 67,464 |
| 38 | Corundum.....short tons.. | 600 | 108,000 |
| 39 | Barytes (crude) .....long tons.. | 25,000 | 100,000 |
| 40 | Graphite .....pounds.. | ..... | ..... |
| 41 | Millstones..... | ..... | 150,000 |
| 42 | Oilstones, etc. *a*.....pounds.. | 800,000 | 12,000 |
| 43 | Marls .....short tons.. | 875,000 | 437,500 |
| 44 | Flint.....long tons.. | 30,000 | 120,000 |
| 45 | Fluorspar .....short tons.. | 4,000 | 20,000 |
| 46 | Chromic iron ore .....long tons.. | 2,000 | 35,000 |
| 47 | Infusorial earth .....short tons.. | 1,000 | 5,000 |
| 48 | Feldspar .....long tons.. | 10,900 | 55,112 |
| 49 | Mica .....pounds.. | 147,410 | 368,525 |
| 50 | Cobalt oxide.....do.... | 2,000 | 5,100 |
| 51 | Slate ground as a pigment.....short tons.. | 2,000 | 20,000 |
| 52 | Sulphur .....do.... | 500 | 12,000 |
| 53 | Asbestos .....do.... | 1,000 | 30,000 |
| 54 | Rutile.....pounds.. | 600 | 2,000 |
| 55 | Lithographic stone .....short tons.. | ..... | ..... |
| 56 | Total value of nonmetallic mineral products. | ..... | 221,879,506 |
| 57 | Total value of metallic products..... | ..... | 186,109,599 |
| 58 | Estimated value of mineral products unspecified.. | ..... | 5,000,000 |
| 59 | Grand total ..... | ..... | 412,989,105 |

*a* Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

*the calendar years 1880 to 1896*—Continued.

| 1885. | | 1886. | | 1887. | | |
|---|---|---|---|---|---|---|
| Quantity. | Value. | Quantity. | Value. | Quantity. | Value. | |
| 4,044,425 | $64,712,400 | 5,683,329 | $95,195,760 | 6,417,148 | $121,925,800 | 1 |
| 39,910,279 | 51,600,000 | 39,445,312 | 51,000,000 | 41,269,240 | 53,350,000 | 2 |
| 1,538,376 | 31,800,000 | 1,881,250 | 35.000,000 | 1,596,500 | 33,000,000 | 3 |
| 170,962,607 | 18,292,999 | 161,235,381 | 16,527,651 | 185,227,331 | 21,115,916 | 4 |
| 129,412 | 10,469,431 | 130,629 | 12,200,749 | 145,700 | 13,113,000 | 5 |
| 40,688 | 3,539,856 | 42,641 | 3,752,408 | 50,340 | 4,782,300 | 6 |
| 32,073 | 979,189 | 29,981 | 1,060,000 | 33,825 | 1,429,000 | 7 |
| 277,904 | 179,975 | 214,992 | 127,157 | 205,566 | 133,200 | 8 |
| 283 | 2,550 | 3,000 | 27,000 | 18,000 | 59,000 | 9 |
| 50 | 10,000 | 35 | 7,000 | 75 | 15,000 | 10 |
| 250 | 187 | 50 | 100 | 448 | 1,838 | 11 |
| ..... | 181,586,587 | ..... | 214,897,825 | ..... | 248,925,054 | 12 |
| 64,840,668 | 82,347,648 | 73,707,957 | 78,481,056 | 87,887,360 | 98,004,656 | 13 |
| 34,228,548 | 76,671,948 | 84,853,077 | 76,119,120 | 37,578,747 | 84,552,181 | 14 |
| ..... | 19,000,000 | ..... | 19,000,000 | ..... | 25,000,000 | 15 |
| 21,847,205 | 19,198,243 | 28,064,841 | 19,996,313 | 28,278,866 | 18,877,094 | 16 |
| 40,000,000 | 20,000,000 | ..... | ..... | ..... | ..... | 17 |
| ..... | 4,857,200 | ..... | 10,012,000 | ..... | 15,817,500 | 18 |
| ..... | ..... | ..... | 6,200,000 | ..... | 7,000,000 | 19 |
| 36,000 | 275,000 | 40,000 | 325,000 | 43,000 | 340,000 | 20 |
| 4,150,000 | 3,492,500 | 4,500,000 | 3,990,000 | 6,692,744 | 5,674,377 | 21 |
| 7,038,653 | 4,825,345 | 7,707,081 | 4,736,585 | 7,831,962 | 4,093,846 | 22 |
| 437,856 | 2,846,064 | 430,549 | 1,872,936 | 480,558 | 1,836,818 | 23 |
| 3,356,956 | 1,678,478 | 4,717,163 | 2,830,297 | 5,377,000 | 3,226,200 | 24 |
| 9,148,401 | 1,312,845 | 8,950,317 | 1,284,070 | 8,259,609 | 1,261,463 | 25 |
| 15,000 | 1,050,000 | 18,000 | 1,440,000 | 18,000 | 1,440,000 | 26 |
| 3,950 | 43,575 | 18,800 | 315,000 | 22,000 | 330,000 | 27 |
| 8,000,000 | 480,000 | 9,778,290 | 488,915 | 11,000,000 | 550,000 | 28 |
| 90,405 | 405,000 | 95,250 | 428,625 | 95,000 | 425,000 | 29 |
| ..... | 500,000 | ..... | 250,000 | ..... | 224,400 | 30 |
| 10,000 | 110,000 | 12,000 | 125,000 | 15,000 | 160,000 | 31 |
| 49,000 | 220,500 | 55,000 | 220,000 | 52,000 | 210,000 | 32 |
| 10,000 | 200,000 | 12,000 | 225,000 | 12,000 | 225,000 | 33 |
| 23,258 | 190,281 | 30,193 | 277,636 | 34,524 | 333,844 | 34 |
| 3,000 | 10,500 | 3,500 | 14,000 | 4,000 | 16,000 | 35 |
| ..... | 209,900 | ..... | 119,056 | ..... | 163,600 | 36 |
| 310,000 | 89,900 | 428,334 | 141,350 | 199,087 | 61,717 | 37 |
| 600 | 108,000 | 645 | 116,190 | 600 | 108,000 | 38 |
| 15,000 | 75,000 | 10,000 | 50,000 | 15,000 | 75,000 | 39 |
| 327,883 | 26,231 | 415,525 | 33,242 | 416,000 | 34,000 | 40 |
| ..... | 100,000 | ..... | 140,000 | ..... | 100,000 | 41 |
| 1,000,000 | 15,000 | 1,160,000 | 15,000 | 1,200,000 | 16,000 | 42 |
| 875,000 | 437,500 | 800,000 | 400,000 | 600,000 | 300,000 | 43 |
| 30,000 | 120,000 | 30,000 | 120,000 | 32,000 | 128,000 | 44 |
| 5,000 | 22,500 | 5,000 | 22,000 | 5,000 | 20,000 | 45 |
| 2,700 | 40,000 | 2,000 | 30,000 | 3,000 | 40,000 | 46 |
| 1,000 | 5,000 | 1,200 | 6,000 | 3,000 | 15,000 | 47 |
| 13,600 | 68,000 | 14,900 | 74,500 | 10,200 | 61,200 | 48 |
| 92,000 | 161,000 | 40,000 | 70,000 | 70,000 | 142,250 | 49 |
| 68,723 | 65,373 | 35,000 | 36,878 | 18,340 | 18,774 | 50 |
| 1,975 | 24,687 | ..... | ..... | ..... | ..... | 51 |
| 715 | 17,875 | 2,500 | 75,000 | 3,000 | 100,000 | 52 |
| 300 | 9,000 | 200 | 6,000 | 150 | 4,500 | 53 |
| 600 | 2,000 | 600 | 2,000 | 1,000 | 3,000 | 54 |
| ..... | ..... | ..... | ..... | ..... | ..... | 55 |
| ..... | 241,312,093 | ..... | 230,088,769 | ..... | 270,989,420 | 56 |
| ..... | 181,586,587 | ..... | 214,897,825 | ..... | 248,925,054 | 57 |
| ..... | 5,000,000 | ..... | 800,000 | ..... | 800,000 | 58 |
| ..... | 427,898,680 | ..... | 445,786,594 | ..... | 520,714,474 | 59 |

*Mineral products of the United States*

| | Product. | 1888. | |
|---|---|---|---|
| | | Quantity. | Value. |
| | METALLIC. | | |
| 1 | Pig iron, value at Philadelphia ..... long tons.. | 6,489,738 | $107,000,000 |
| 2 | Silver, coining value ..... troy ounces.. | 45,783,632 | 59,195,000 |
| 3 | Gold, coining value ..... do.... | 1,604,927 | 33,175,000 |
| 4 | Copper, value at New York City ..... pounds.. | 231,270,622 | 33,833,954 |
| 5 | Lead, value at New York City ..... short tons.. | 151,919 | 13,399,256 |
| 6 | Zinc, value at New York City ..... do.... | 55,903 | 5,500,855 |
| 7 | Quicksilver, value at San Francisco ..... flasks.. | 33,250 | 4,113,125 |
| 8 | Aluminum, value at Pittsburg ..... pounds.. | 19,000 | 65,000 |
| 9 | Antimony, value at San Francisco .... short tons.. | 100 | 20,000 |
| 10 | Nickel, value at Philadelphia ..... pounds.. | 204,328 | 127,632 |
| 11 | Tin ..... do.... | ..... | ..... |
| 12 | Platinum (crude), value at San Francisco, troy ounces ..... | 500 | 2,000 |
| 13 | Total value of metallic products ..... | ..... | 253,731,822 |
| | NONMETALLIC (spot values). | | |
| 14 | Bituminous coal ..... short tons.. | 102,039,838 | 101,860,529 |
| 15 | Pennsylvania anthracite ..... long tons.. | 41,624,611 | 89,020,483 |
| 16 | Building stone ..... | ..... | 25,500,000 |
| 17 | Petroleum ..... barrels.. | 27,612,025 | 17,947,620 |
| 18 | Natural gas ..... | ..... | 22,629,875 |
| 19 | Brick clay ..... | ..... | 7,500,000 |
| 20 | Clay (all other than brick) ..... long tons.. | 36,750 | 300,000 |
| 21 | Cement ..... barrels.. | 6,503,295 | 5,021,139 |
| 22 | Mineral waters ..... gallons sold.. | 9,578,648 | 1,679,302 |
| 23 | Phosphate rock ..... long tons.. | 448,567 | 2,018,552 |
| 24 | Salt ..... barrels.. | 8,055,881 | 4,374,203 |
| 25 | Limestone for iron flux ..... long tons.. | 5,438,000 | 2,719,000 |
| 26 | Zinc white ..... short tons.. | 20,000 | 1,600,000 |
| 27 | Gypsum ..... do.... | 110,000 | 550,000 |
| 28 | Borax ..... pounds.. | 7,589,000 | 455,340 |
| 29 | Mineral paints ..... short tons.. | 26,500 | 405,000 |
| 30 | Grindstones ..... | ..... | 281,800 |
| 31 | Fibrous talc ..... short tons.. | 20,000 | 210,000 |
| 32 | Asphaltum ..... do.... | 53,800 | 331,500 |
| 33 | Soapstone ..... do.... | 15,000 | 250,000 |
| 34 | Precious stones ..... | ..... | 139,850 |
| 35 | Pyrites ..... long tons.. | 54,331 | 167,658 |
| 36 | Corundum ..... short tons.. | 589 | 91,620 |
| 37 | Oilstones, etc. *a* ..... pounds.. | 1,500,000 | 18,000 |
| 38 | Mica ..... do.... | 48,000 | 70,000 |
| 39 | Barytes (crude) ..... long tons.. | 20,000 | 110,000 |
| 40 | Bromine ..... pounds.. | 307,386 | 95,290 |
| 41 | Fluorspar ..... short tons.. | 6,000 | 30,000 |
| 42 | Feldspar ..... long tons.. | 8,700 | 50,000 |
| 43 | Manganese ore ..... do.... | 29,198 | 279,571 |
| 44 | Flint ..... do.... | 30,000 | 127,500 |
| 45 | Graphite ..... pounds.. | 400,000 | 33,000 |
| 46 | Bauxite ..... long tons.. | ..... | ..... |
| 47 | Sulphur ..... short tons.. | ..... | ..... |
| 48 | Marls ..... do.... | 300,000 | 150,000 |
| 49 | Infusorial earth ..... do.... | 1,500 | 7,500 |
| 50 | Millstones ..... | ..... | 81,000 |
| 51 | Chromic iron ore ..... long tons.. | 1,500 | 20,000 |
| 52 | Cobalt oxide ..... pounds.. | 8,491 | 15,782 |
| 53 | Magnesite ..... short tons.. | ..... | ..... |
| 54 | Asbestos ..... do.... | 100 | 3,000 |
| 55 | Rutile ..... pounds.. | 1,000 | 3,000 |
| 56 | Ozocerite (refined) ..... do.... | 43,500 | 3,000 |
| 57 | Total value of nonmetallic mineral products. | ..... | 286,150,114 |
| 58 | Total value of metallic products ..... | ..... | 253,731,822 |
| 59 | Estimated value of mineral products unspecified. | ..... | 900,000 |
| 60 | Grand total ..... | ..... | 540,781,936 |

*a* Prior to 1889, quantity and value are for rough stone quarried; since 1890 they are for finished product.

*for the calendar years 1880 to 1896*—Continued.

| 1889. | | 1890. | | 1891. | | |
|---|---|---|---|---|---|---|
| Quantity. | Value. | Quantity. | Value. | Quantity. | Value. | |
| 7,603,642 | $120,000,000 | 9,202,703 | $151,200,410 | 8,279,870 | $128,337,985 | 1 |
| 51,354,851 | 66,396,988 | 54,500,000 | 70,464,645 | 58,330,000 | 75,416,565 | 2 |
| 1,590,869 | 32,886,744 | 1,588,880 | 32,845,000 | 1,604,840 | 33,175,000 | 3 |
| 231,246,214 | 26,907,809 | 265,115,133 | 30,848,797 | 295,812,076 | 38,455,300 | 4 |
| 156,397 | 13,794,235 | 143,630 | 12,668,166 | 178,554 | 15,534,198 | 5 |
| 58,860 | 5,791,824 | 63,683 | 6,266,407 | 80,873 | 8,033,700 | 6 |
| 26,484 | 1,190,500 | 22,926 | 1,203,615 | 22,904 | 1,036,386 | 7 |
| 47,468 | 97,335 | 61,281 | 61,281 | 150,000 | 100,000 | 8 |
| 115 | 28,000 | 129 | 40,756 | 278 | 47,007 | 9 |
| 252,663 | 151,598 | 223,488 | 134,093 | 118,498 | 71,099 | 10 |
| ..... | ..... | ..... | ..... | 125,289 | 25,058 | 11 |
| 500 | 2,000 | 600 | 2,500 | 100 | 500 | 12 |
| ..... | 267,247,033 | ..... | 305,735,670 | ..... | 300,232,798 | 13 |
| 95,685,543 | 94,504,745 | 111,320,016 | 110,420,801 | 117,901,237 | 117,188,400 | 14 |
| 40,714,721 | 65,879,514 | 41,489,858 | 66,383,772 | 45,236,992 | 73,944,735 | 15 |
| ..... | 42,809,706 | ..... | 47,000,000 | ..... | 47,294,746 | 16 |
| 35,163,513 | 26,963,340 | 45,822,672 | 35,365,105 | 54,291,980 | 30,526,553 | 17 |
| ..... | 21,097,099 | ..... | 18,742,725 | ..... | 15,500,084 | 18 |
| ..... | 8,000,000 | ..... | 8,500,000 | ..... | 9,000,000 | 19 |
| 294,344 | 635,578 | 350,000 | 756,000 | 400,000 | 900,000 | 20 |
| 7,000,000 | 5,000,000 | 8,000,000 | 6,000,000 | 8,222,792 | 6,680,951 | 21 |
| 12,780,471 | 1,748,458 | 13,907,418 | 2,600,750 | 18,392,732 | 2,996,259 | 22 |
| 550,245 | 2,937,776 | 510,499 | 3,213,795 | 587,988 | 3,651,150 | 23 |
| 8,005,565 | 4,195,412 | 8,776,991 | 4,752,286 | 9,987,945 | 4,716,121 | 24 |
| 6,318,000 | 3,159,000 | 5,521,622 | 2,760,811 | 5,000,000 | 2,300,000 | 25 |
| 16,970 | 1,357,600 | ..... | 1,600,000 | 23,700 | 1,600,000 | 26 |
| 267,769 | 764,118 | 182,995 | 574,523 | 208,126 | 628,051 | 27 |
| 8,000,000 | 500,000 | 9,500,000 | 617,500 | 13,380,000 | 869,700 | 28 |
| 34,307 | 483,766 | 47,732 | 681,992 | 49,652 | 678,478 | 29 |
| ..... | 439,587 | ..... | 450,000 | ..... | 476,113 | 30 |
| 23,746 | 244,170 | 41,354 | 389,196 | 53,054 | 493,068 | 31 |
| 51,735 | 171,537 | 40,841 | 190,416 | 45,054 | 242,264 | 32 |
| 12,715 | 231,708 | 13,670 | 252,309 | 16,514 | 243,981 | 33 |
| ..... | 188,807 | ..... | 118,833 | ..... | 235,300 | 34 |
| 93,705 | 202,119 | 99,854 | 273,745 | 106,536 | 338,880 | 35 |
| 2,245 | 105,565 | 1,970 | 89,395 | 2,265 | 90,230 | 36 |
| 5,982,000 | 32,980 | ..... | 69,909 | 1,375,000 | 150,000 | 37 |
| 49,500 | 50,000 | 60,000 | 75,000 | 75,000 | 100,000 | 38 |
| 19,161 | 106,313 | 21,911 | 86,505 | 31,069 | 118,363 | 39 |
| 418,891 | 125,667 | 387,847 | 104,719 | 343,000 | 54,880 | 40 |
| 9,500 | 45,835 | 8,250 | 55,328 | 10,044 | 78,330 | 41 |
| 6,970 | 39,370 | 8,000 | 45,200 | 10,000 | 50,000 | 42 |
| 24,197 | 240,559 | 25,684 | 219,050 | 23,416 | 239,129 | 43 |
| 21,113 | 89,730 | 13,000 | 57,400 | 15,000 | 60,000 | 44 |
| ..... | 72,662 | ..... | 77,500 | ..... | 110,000 | 45 |
| 728 | 2,366 | 1,844 | 6,012 | 3,593 | 11,675 | 46 |
| 1,150 | 7,850 | ..... | ..... | 1,200 | 39,600 | 47 |
| 139,522 | 63,956 | 153,620 | 69,880 | 135,000 | 67,500 | 48 |
| 3,466 | 23,372 | 2,532 | 50,240 | ..... | 21,988 | 49 |
| ..... | 35,155 | ..... | 23,720 | ..... | 16,587 | 50 |
| 2,000 | 30,000 | 3,599 | 53,985 | 1,372 | 20,580 | 51 |
| 13,955 | 31,092 | 6,788 | 16,291 | 7,200 | 18,000 | 52 |
| ..... | ..... | ..... | ..... | 439 | 4,390 | 53 |
| 30 | 1,800 | 71 | 4,560 | 66 | 3,960 | 54 |
| 1,000 | 3,000 | 400 | 1,000 | 300 | 800 | 55 |
| 50,000 | 2,500 | 350,000 | 26,250 | 50,000 | 7,000 | 56 |
| ..... | 282,623,812 | ..... | 312,776,503 | ..... | 321,767,846 | 57 |
| ..... | 267,247,033 | ..... | 305,735,670 | ..... | 300,232,798 | 58 |
| ..... | 1,000,000 | ..... | 1,000,000 | ..... | 1,000,000 | 59 |
| ..... | 550,870,845 | ..... | 619,512,173 | ..... | 623,000,644 | 60 |

*Mineral products of the United States*

| | Product. | 1892. Quantity. | 1892. Value. |
|---|---|---|---|
| | METALLIC. | | |
| 1 | Pig iron, value at Philadelphia.....long tons.. | 9,157,000 | $131,161,039 |
| 2 | Silver, coining value.....troy ounces.. | 63,500,000 | 82,099,150 |
| 3 | Gold, coining value.....do.... | 1,596,375 | 33,000,000 |
| 4 | Copper, value at New York City.....pounds.. | 352,971,744 | 37,977,142 |
| 5 | Lead, value at New York City.....short tons.. | 173,654 | 13,892,320 |
| 6 | Zinc, value at New York City.....do.... | 87,260 | 8,027,920 |
| 7 | Quicksilver, value at San Francisco.....flasks.. | 27,993 | 1,245,689 |
| 8 | Aluminum, value at Pittsburg.....pounds.. | 259,885 | 172,824 |
| 9 | Antimony, value at San Francisco....short tons.. | ..... | 56,466 |
| 10 | Nickel, value at Philadelphia.....pounds.. | 92,252 | 50,739 |
| 11 | Tin.....do.... | 162,000 | 32,400 |
| 12 | Platinum (crude), value at San Francisco, troy ounces..... | 80 | 550 |
| 13 | Total value of metallic products..... | ..... | 307,716,239 |
| | NONMETALLIC (spot values). | | |
| 14 | Bituminous coal.....short tons.. | 126,856,567 | 125,124,381 |
| 15 | Pennsylvania anthracite.....long tons.. | 46,850,450 | 82,442,000 |
| 16 | Building stone..... | ..... | 48,706,625 |
| 17 | Petroleum.....barrels.. | 50,509,136 | 26,034,196 |
| 18 | Natural gas..... | ..... | 14,800,714 |
| 19 | Brick clay..... | ..... | 9,000,000 |
| 20 | Clay (all other than brick).....long tons.. | 420,000 | 1,000,000 |
| 21 | Cement.....barrels.. | 8,758,621 | 7,152,750 |
| 22 | Mineral waters.....gallons sold.. | 21,876,604 | 4,905,970 |
| 23 | Phosphate rock.....long tons.. | 681,571 | 3,296,227 |
| 24 | Salt.....barrels.. | 11,698,890 | 5,654,915 |
| 25 | Limestone for iron flux.....long tons.. | 5,172,114 | 3,620,480 |
| 26 | Zinc white.....short tons.. | 27,500 | 2,200,000 |
| 27 | Gypsum.....do.... | 256,259 | 695,492 |
| 28 | Borax.....pounds.. | 13,500,000 | 900,000 |
| 29 | Mineral paints.....short tons.. | 51,704 | 767,766 |
| 30 | Grindstones..... | ..... | 272,244 |
| 31 | Fibrous talc.....short tons.. | 41,925 | 472,485 |
| 32 | Asphaltum.....do.... | 87,680 | 445,375 |
| 33 | Soapstone.....do.... | 23,908 | 437,449 |
| 34 | Precious stones..... | ..... | 312,050 |
| 35 | Pyrites.....long tons.. | 109,788 | 305,191 |
| 36 | Corundum.....short tons.. | 1,771 | 181,300 |
| 37 | Oilstones, etc..... | ..... | 146,730 |
| 38 | Mica.....pounds.. | 75,000 | 100,000 |
| 39 | Barytes (crude).....long tons.. | 32,108 | 130,025 |
| 40 | Bromine.....pounds.. | 379,480 | 64,502 |
| 41 | Fluorspar.....short tons.. | 12,250 | 89,000 |
| 42 | Feldspar.....long tons.. | 15,000 | 75,000 |
| 43 | Manganese ore.....do.... | 13,613 | 129,586 |
| 44 | Flint.....do.... | 20,000 | 80,000 |
| 45 | Monazite.....pounds.. | ..... | ..... |
| 46 | Graphite.....do.... | ..... | 104,000 |
| 47 | Bauxite.....long tons.. | 10,518 | 34,183 |
| 48 | Sulphur.....short tons.. | 2,688 | 80,640 |
| 49 | Fuller's earth.....do.... | ..... | ..... |
| 50 | Marls.....do.... | 125,000 | 65,000 |
| 51 | Infusorial earth.....do.... | ..... | 43,655 |
| 52 | Millstones..... | ..... | 23,417 |
| 53 | Chromic iron ore.....long tons.. | 1,500 | 25,000 |
| 54 | Cobalt oxide.....pounds.. | 7,869 | 15,738 |
| 55 | Magnesite.....short tons.. | 1,004 | 10,040 |
| 56 | Asbestos.....do.... | 104 | 6,416 |
| 57 | Rutile.....pounds.. | 100 | 300 |
| 58 | Ozocerite (refined).....do.... | 60,000 | 8,000 |
| 59 | Total value of nonmetallic mineral products..... | ..... | 339,958,842 |
| 60 | Total value of metallic products..... | ..... | 307,716,239 |
| 61 | Estimated value of mineral products unspecified.. | ..... | 1,000,000 |
| 62 | Grand total..... | ..... | 648,675,081 |

*for the calendar years 1880 to 1896*—Continued.

| 1893. | | 1894. | | 1895. | | |
|---|---|---|---|---|---|---|
| Quantity. | Value. | Quantity. | Value. | Quantity. | Value. | |
| 7, 124, 502 | $84, 810, 426 | 6, 657, 388 | $65, 007, 247 | 9, 446, 308 | $105, 198, 550 | 1 |
| 60, 000, 000 | 77, 575, 757 | 49, 501, 122 | 64, 000, 000 | 55, 727, 000 | 72, 051, 000 | 2 |
| 1, 739, 081 | 35, 950, 000 | 1, 910, 816 | 39, 500, 000 | 2, 254, 760 | 46, 610, 000 | 3 |
| 339, 785, 972 | 32, 054, 601 | 364, 866, 808 | 33, 141, 142 | 392, 639, 964 | 38, 682, 347 | 4 |
| 163, 982 | 11, 839, 590 | 159, 331 | 9, 942, 254 | 170, 000 | 11, 220, 000 | 5 |
| 78, 832 | 6, 306, 560 | 75, 328 | 5, 288, 026 | 89, 686 | 6, 278, 020 | 6 |
| 30, 164 | 1, 108, 527 | 30, 416 | 934, 000 | 36, 104 | 1, 337, 131 | 7 |
| 339, 629 | 266, 903 | 550, 000 | 316, 250 | 920, 000 | 464, 600 | 8 |
| 250 | 45, 000 | 200 | 36, 000 | 450 | 68, 000 | 9 |
| 49, 399 | 22, 197 | 9, 616 | 3, 269 | 10, 302 | 3, 091 | 10 |
| 8, 938 | 1, 788 | ..... | ..... | ..... | ..... | 11 |
| 75 | 517 | 100 | 600 | 150 | 900 | 12 |
| ..... | 249, 981, 866 | ..... | 218, 168, 788 | ..... | 281, 913, 639 | 13 |
| 128, 385, 231 | 122, 751, 618 | 118, 820, 405 | 107, 653, 501 | 135, 118, 193 | 115, 749, 771 | 14 |
| 48, 185, 306 | 85, 687, 078 | 46, 358, 144 | 78, 488, 063 | 51, 785, 122 | 82, 019, 272 | 15 |
| ..... | 33, 885, 573 | ..... | 37, 055, 030 | ..... | 34, 688, 816 | 16 |
| 48, 412, 666 | 28, 932, 326 | 49, 344, 516 | 35, 522, 095 | 52, 892, 276 | 57, 632, 296 | 17 |
| ..... | 14, 346, 250 | ..... | 13, 954, 400 | ..... | 13, 006, 650 | 18 |
| ..... | 9, 000, 000 | ..... | 9, 000, 000 | ..... | 9, 000, 000 | 19 |
| 400, 000 | 900, 000 | 360, 000 | 800, 000 | 360, 000 | 800, 000 | 20 |
| 8, 002, 467 | 6, 262, 841 | 8, 362, 245 | 5, 030, 081 | 8, 731, 401 | 5, 482, 254 | 21 |
| 23, 544, 495 | 4, 246, 734 | 21, 569, 608 | 3, 741, 846 | 21, 463, 543 | 4, 254, 237 | 22 |
| 941, 368 | 4, 136, 070 | 996, 949 | 3, 479, 547 | 1, 038, 551 | 3, 606, 094 | 23 |
| 11, 816, 772 | 4, 054, 668 | 12, 967, 417 | 4, 739, 285 | 13, 669, 649 | 4, 423, 084 | 24 |
| 3, 958, 055 | 2, 374, 833 | 3, 698, 550 | 1, 849, 275 | 5, 247, 949 | 2, 623, 974 | 25 |
| 24, 059 | 1, 804, 420 | 19, 987 | 1, 399, 090 | 20, 710 | 1, 449, 700 | 26 |
| 253, 615 | 696, 615 | 239, 312 | 761, 719 | 265, 503 | 807, 447 | 27 |
| 8, 699, 000 | 652, 425 | 14, 680, 130 | 974, 445 | 11, 918, 000 | 595, 900 | 28 |
| 37, 724 | 530, 384 | 41, 926 | 498, 093 | 50, 695 | 621, 552 | 29 |
| ..... | 338, 787 | ..... | 223, 214 | ..... | 205, 768 | 30 |
| 35, 861 | 403, 436 | 39, 906 | 435, 060 | 39, 240 | 370, 835 | 31 |
| 47, 779 | 372, 232 | 60, 570 | 353, 400 | 68, 163 | 348, 281 | 32 |
| 21, 071 | 255, 067 | 23, 144 | 401, 325 | 21, 495 | 266, 495 | 33 |
| ..... | 264, 041 | ..... | 132, 250 | ..... | 113, 621 | 34 |
| 75, 777 | 256, 552 | 105, 940 | 363, 134 | 99, 549 | 322, 845 | 35 |
| 1, 713 | 142, 325 | 1, 495 | 95, 936 | 2, 102 | 106, 256 | 36 |
| ..... | 135, 173 | ..... | 136, 873 | ..... | 155, 881 | 37 |
| 66, 971 | 88, 929 | ..... | 52, 388 | ..... | 55, 831 | 38 |
| 28, 970 | 88, 506 | 23, 335 | 86, 983 | 21, 529 | 68, 321 | 39 |
| 348, 399 | 104, 520 | 379, 444 | 102, 450 | 517, 421 | 134, 343 | 40 |
| 12, 400 | 84, 000 | 7, 500 | 47, 500 | 4, 000 | 24, 000 | 41 |
| 18, 391 | 96, 553 | 17, 200 | 98, 900 | 23, 200 | 133, 400 | 42 |
| 7, 718 | 66, 614 | 6, 308 | 53, 635 | 9, 547 | 71, 769 | 43 |
| 29, 671 | 103, 848 | 38, 000 | 145, 920 | 36, 800 | 117, 760 | 44 |
| 130, 000 | 7, 600 | 546, 855 | 36, 193 | 1, 573, 000 | 137, 150 | 45 |
| 843, 103 | 63, 232 | 918, 000 | 64, 010 | ..... | 52, 582 | 46 |
| 9, 179 | 29, 507 | 11, 066 | 35, 818 | 17, 069 | 44, 000 | 47 |
| 1, 200 | 42, 000 | 500 | 20, 000 | 1, 800 | 42, 000 | 48 |
| ..... | ..... | ..... | ..... | 6, 900 | 41, 400 | 49 |
| 75, 000 | 40, 000 | 75, 000 | 40, 000 | 60, 000 | 30, 000 | 50 |
| ..... | 22, 582 | ..... | 11, 718 | 4, 954 | 20, 514 | 51 |
| ..... | 16, 645 | ..... | 13, 887 | ..... | 22, 542 | 52 |
| 1, 450 | 21, 750 | 3, 680 | 53, 231 | 1, 740 | 16, 795 | 53 |
| 8, 422 | 10, 346 | 6, 763 | 10, 145 | 14, 458 | 20, 675 | 54 |
| 704 | 7, 040 | 1, 440 | 10, 240 | 2, 200 | 17, 000 | 55 |
| 50 | 2, 500 | 325 | 4, 463 | 795 | 13, 525 | 56 |
| ..... | ..... | 150 | 450 | 100 | 350 | 57 |
| ..... | ..... | ..... | ..... | None. | None. | 58 |
| ..... | 323, 318, 020 | ..... | 307, 975, 593 | ..... | 339, 715, 046 | 59 |
| ..... | 249, 981, 866 | ..... | 218, 168, 788 | ..... | 281, 913, 639 | 60 |
| ..... | 1, 000, 000 | ..... | 1, 000, 000 | ..... | 1, 000, 000 | 61 |
| ..... | 574, 299, 886 | ..... | 527, 144, 381 | ..... | 622, 628, 685 | 62 |

*Mineral products of the United States for the calendar years 1880 to 1896*—Continued.

| | Product. | 1896. Quantity. | Value. |
|---|---|---|---|
| | METALLIC. | | |
| 1 | Pig iron, value at Philadelphia.....long tons.. | 8,623,127 | $90,250,000 |
| 2 | Silver, coining value.....troy ounces.. | 58,834,800 | 76,069,236 |
| 3 | Gold, coining value.....do.... | 2,568,132 | 53,088,000 |
| 4 | Copper, value at New York City.....pounds.. | 460,061,430 | 49,456,603 |
| 5 | Lead, value at New York City.....short tons.. | 188,000 | 10,528,000 |
| 6 | Zinc, value at New York City.....do.... | 81,499 | 6,519,920 |
| 7 | Quicksilver, value at San Francisco.....flasks.. | 30,765 | 1,075,449 |
| 8 | Aluminum, value at Pittsburg.....pounds.. | 1,300,000 | 520,000 |
| 9 | Antimony, value at New York City....short tons.. | 601 | 84,290 |
| 10 | Nickel, value at Philadelphia.....pounds.. | 17,170 | 4,464 |
| 11 | Platinum (crude), value at San Francisco, troy ounces..... | 163 | 944 |
| 12 | Total value of metallic products..... | ..... | 287,596,906 |
| | NONMETALLIC (spot values). | | |
| 13 | Bituminous coal.....short tons.. | 137,640,276 | 114,891,515 |
| 14 | Pennsylvania anthracite.....long tons.. | 48,523,287 | 81,748,651 |
| 15 | Building stone..... | ..... | 31,346,171 |
| 16 | Petroleum.....barrels.. | 60,960,361 | 58,518,709 |
| 17 | Natural gas..... | ..... | 13,002,512 |
| 18 | Brick clay..... | ..... | 9,000,000 |
| 19 | Clay (all other than brick).....long tons.. | 360,000 | 800,000 |
| 20 | Cement.....barrels.. | 9,513,473 | 6,473,213 |
| 21 | Mineral waters.....gallons sold.. | 25,795,312 | 4,136,192 |
| 22 | Phosphate rock.....long tons.. | 930,779 | 2,803,372 |
| 23 | Salt.....barrels.. | 13,850,726 | 4,040,839 |
| 24 | Limestone for iron flux.....long tons.. | 4,120,102 | 2,060,000 |
| 25 | Zinc white.....short tons.. | 20,000 | 1,400,000 |
| 26 | Gypsum.....do.... | 224,139 | 573,344 |
| 27 | Borax.....pounds.. | 13,508,000 | 675,400 |
| 28 | Mineral paints.....short tons.. | 48,032 | 530,455 |
| 29 | Grindstones..... | ..... | 326,826 |
| 30 | Fibrous talc.....short tons.. | 46,089 | 399,443 |
| 31 | Asphaltum.....do.... | 80,503 | 577,563 |
| 32 | Soapstone.....do.... | 22,183 | 354,065 |
| 33 | Precious stones..... | ..... | 97,850 |
| 34 | Pyrites.....long tons.. | 115,483 | 320,163 |
| 35 | Corundum and emery.....short tons.. | 2,120 | 113,246 |
| 36 | Oilstones, etc..... | ..... | 127,098 |
| 37 | Mica (sheet)..... | ..... | 65,441 |
| 38 | Mica (scrap)..... | ..... | 1,750 |
| 39 | Barytes (crude).....long tons.. | 17,068 | 46,513 |
| 40 | Bromine.....pounds.. | 546,580 | 144,501 |
| 41 | Fluorspar.....short tons.. | 6,500 | 52,000 |
| 42 | Feldspar.....long tons.. | 9,114 | 35,200 |
| 43 | Manganese ore.....do.... | 10,088 | 90,927 |
| 44 | Flint.....do.... | 11,124 | 24,226 |
| 45 | Monazite.....pounds.. | 30,000 | 1,500 |
| 46 | Graphite (crystalline).....do.... | 535,858 | 48,460 |
| 47 | Graphite (amorphous).....short tons.. | 760 | |
| 48 | Bauxite.....long tons.. | 18,364 | 47,338 |
| 49 | Sulphur.....short tons.. | 5,260 | 87,200 |
| 50 | Fuller's earth.....do.... | 9,872 | 59,360 |
| 51 | Marls.....do.... | 60,000 | 30,000 |
| 52 | Infusorial earth.....do.... | 3,846 | 26,792 |
| 53 | Millstones..... | ..... | 22,567 |
| 54 | Chromic iron ore..... long tons.. | 786 | 6,667 |
| 55 | Cobalt oxide.....pounds.. | 10,700 | 15,301 |
| 56 | Magnesite.....short tons.. | 1,500 | 11,000 |
| 57 | Asbestos.....do.... | 504 | 6,100 |
| 58 | Rutile.....pounds.. | 100 | 350 |
| 59 | Total value of nonmetallic mineral products.. | ..... | 335,139,820 |
| 60 | Total value of metallic products..... | ..... | 287,596,906 |
| 61 | Estimated value of mineral products unspecified. | ..... | 1,000,000 |
| 62 | Grand total..... | ..... | 623,736,726 |

# IRON ORES.

By JOHN BIRKINBINE.

## PRODUCTION.

The year which ended December 31, 1897, was the banner year of pig-iron production in the United States. The output was also the largest ever reported by any country in one year. It is therefore natural to expect that the American iron-ore industry, which supplied raw material for the manufacture of pig iron, would also reach its maximum output in 1897. This was the case. The total for the whole country reached 17,518,046 long tons of iron ore, which is 1,221,380 long tons, or 7.49 per cent, more than the former maximum of 16,296,666 long tons in the year 1892.

During the year twenty-five States and Territories contributed to the total, one State—Vermont—joining the ranks of the producers with a small amount of manganiferous iron ore. While the production for the entire country showed a marked increase, all the States, with the exception of the southern group, of Alabama, Georgia, Tennessee, and Texas, and the States of Michigan and Minnesota in the Lake Superior region, produced less than in 1896. In Minnesota the improvement was most marked and showed an advance which nearly equaled the difference between the totals for the United States in 1896 and 1897, viz, 1,512,597 long tons.

The following table presents the total production of iron ore in the United States since the United States Geological Survey commenced the systematic collection of data in the year 1889:

*Production of iron ore in the United States from 1889 to 1897.*

| Year. | Production. | Year. | Production. |
|---|---|---|---|
| | *Long tons.* | | *Long tons.* |
| 1889 | 14,518,041 | 1894 | 11,879,679 |
| 1890 | 16,036,043 | 1895 | 15,957,614 |
| 1891 | 14,591,178 | 1896 | 16,005,449 |
| 1892 | 16,296,666 | 1897 | 17,518,046 |
| 1893 | 11,587,629 | | |

Placing the years in the order of production, they rank as follows: 1897, 1892, 1890, 1896, 1895, 1891, 1889, 1894, 1893. The mean production for the nine years was 14,932,261 long tons, which slightly exceeds the records of 1889 and 1891.

The tendency to use the richer ores and the facilities which make possible the delivery of these at points remote from the mines have in late years supplied a larger product of pig metal from a given weight of ore than formerly, and consequently the increased output of ore means more than the actual figures suggest.

The domestic iron ore produced in 1897 represents a volume of excavation equivalent to 40 acres, dug to an average depth of 100 feet. This does not include the barren earth or rock necessarily removed in exploitation.

Probably 30 per cent of the ore is won from open excavations, some of them covering many acres, and 70 per cent is taken from underground workings, some of which exceed 1,000 feet in depth, and extend long distances from slopes or shafts sunk into ore lenses or veins.

With continued low prices prevailing and many blast furnaces idle, the average production for the past three years, about 16,500,000 long tons, may be considered as representing the actual annual requirements of the country, subject to possible temporary decrease, but more liable to be permanently augmented as the population of the country increases and its development extends.

In examining the production of the different varieties of iron ore they have been classified as in previous years, viz, red hematite, brown hematite, magnetite, and carbonate, and it will be seen that the red hematite was the only class which showed an increase, advancing from 12,576,288 long tons in 1896 to 14,413,318 long tons in 1897, a gain of 1,837,030 long tons, or 14.61 per cent. This, the greatest output of this character of ore in any one year, is due to large deposits recently exploited, and also to the ores carrying, as a rule, higher percentages of iron than the other classes. Being rich and easily smelted, red hematites are preferred by many furnace managers.

The brown hematite output decreased from 2,126,212 long tons in 1896 to 1,961,954 long tons in 1897, a loss of 164,258 long tons, or 7.73 per cent, the greatest falling off being in the State of Virginia.

The total quantity of magnetite produced also declined from 1,211,526 long tons in 1896 to 1,059,479 long tons in 1897, a decrease of 152,047 long tons, or 12.55 per cent. Pennsylvania, New York, and Michigan each supplied less magnetite in 1897 than in 1896.

The total amount of carbonate mined in 1896 was 91,423 long tons as against 83,295 long tons in 1897, a loss of 8,128 tons, or 8.89 per cent, chiefly in the State of New York.

Michigan, which held first rank as the producer of red hematite ore, was closely followed by Minnesota. Virginia, as in previous years, was the largest producer of brown hematite, having almost double the

product of its nearest competitor, Alabama. Pennsylvania again heads the list of magnetite producers, easily outclassing New York, which was second. Ohio contributed over two-thirds of the total carbonate ore produced, Maryland ranking second. A comparison with the records of the different States in the reports of the Survey suggests remarkable changes in the production of ores by locality or according to class, and a résumé of the quantities of ore of the general classes recognized in the reports produced in the United States is of interest. Such a résumé is presented in the following statement, which shows the long tons of each class of ore produced in the years for which statistics were collected:

*Production of iron ore in the United States, by classes.*

[Maxima in italic figures.]

| Year. | Red hematite. | Brown hematite. | Magnetite. | Carbonate. | Total. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| 1889.. | 9,056,288 | 2,523,087 | 2,506,415 | *432,251* | 14,518,041 |
| 1890.. | 10,527,650 | 2,559,938 | *2,570,838* | 377,617 | 16,036,043 |
| 1891.. | 9,327,398 | *2,757,564* | 2,317,108 | 189,108 | 14,591,178 |
| 1892.. | 11,646,619 | 2,485,101 | 1,971,965 | 192,981 | 16,296,666 |
| 1893.. | 8,272,637 | 1,849,272 | 1,330,886 | 134,834 | 11,587,629 |
| 1894.. | 9,347,434 | 1,472,748 | 972,219 | 87,278 | 11,879,679 |
| 1895.. | 12,513,995 | 2,102,358 | 1,268,222 | 73,039 | 15,957,614 |
| 1896.. | 12,576,288 | 2,126,212 | 1,211,526 | 91,423 | 16,005,449 |
| 1897.. | *14,413,318* | 1,961,954 | 1,059,479 | 83,295 | *17,518,046* |

The reported product of concentrated iron ore during the year 1897 is 19,713 long tons. It is included in the totals given in the various tables.

In addition to the iron ore mined, residuum, obtained in the manufacture of zinc, was utilized to produce spiegeleisen during the year 1897 to the amount of 33,924 long tons, valued at $18,713, or 55 cents per ton.

The magnetite mined in the United States in 1897 represented an average of but about 6 per cent of the total domestic production, and for the past ten years the quantity of magnetic iron has been equivalent to about 12 per cent of the total annual output.

The developments in the Lake Superior and the Alabama-Tennessee regions have encouraged the mining of red hematite ores in greater proportions each year, the Lake Superior region supplying in 1897 nearly 70 per cent of the domestic iron ore product, most of which is of the red hematite character.

The growing industry of the Southern States relies almost exclusively upon local red and brown hematites, the former largely predominating.

The quantity of each variety of ore produced, by States, is set forth in the following table:

*Production of different varieties of iron ore, by States, in the year 1897.*

[Maxima in italic figures.]

| State. | Red hematite. | Brown hematite. | Magnetite. | Carbonate. | Total. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Michigan | *6,041,597* | | 45,866 | | *6,087,463* |
| Minnesota | 5,601,429 | | | | 5,601,429 |
| Alabama | 1,738,583 | 360,038 | | | 2,098,621 |
| Pennsylvania | 19,515 | 256,573 | *441,556* | 6,098 | 723,742 |
| Virginia | 13,570 | *697,558* | | | 711,128 |
| Tennessee | 260,550 | 343,947 | | | 604,497 |
| Wisconsin | 554,155 | | | | 554,155 |
| New York | 7,664 | 20,059 | 296,722 | 11,280 | 335,725 |
| New Jersey | | | 254,235 | | 254,235 |
| Georgia and North Carolina | 131,540 | 73,099 | | | 204,639 |
| Colorado | 21,500 | 165,814 | | | 187,314 |
| Ohio | | | | *54,417* | 54,417 |
| Montana, Nevada, New Mexico, Utah, and Wyoming | 10,151 | 8,705 | 21,100 | | 39,956 |
| Connecticut, Vermont, and Massachusetts | | 22,573 | | | 22,573 |
| Texas | | 13,588 | | | 13,588 |
| Kentucky | 12,464 | | | | 12,464 |
| Maryland | | | | 11,500 | 11,500 |
| Missouri | 600 | | | | 600 |
| Total | 14,413,318 | 1,961,954 | 1,059,479 | 83,295 | 17,518,046 |

The above figures will be supplemented later by remarks concerning the status of various States, considered in their order of prominence as producers of iron ore.

## VALUE OF IRON ORE.

The total valuation at the mines of the 17,518,046 long tons of iron ore produced in the United States in the year 1897, was $18,953,221, or $1.08 per ton. This indicates a decided decline from the average price reported in 1896, $1.42 per ton, of 34 cents per ton, equivalent to 23.94 per cent. The lowest value of ore at the mine was in the State of Minnesota, where the average was 72 cents per ton, this low price being

influenced by the distances to be covered before reaching blast furnaces, and a diminished value due to the fact that the Mesabi ores (which comprise the greater portion of the product from that State) do not, on account of their physical characteristics, command as high prices as other Lake Superior ores of the same chemical composition. Minnesota was but slightly surpassed in value per ton by Alabama, whose comparatively lean ores were valued at 74 cents per ton at the mine. The highest value reported was in Colorado, where a large portion of the iron ores was used as flux in smelting the precious metals, and the higher wages paid increased the mining costs.

While there was augmented demand for iron ores in 1897 over 1896, the ores did not, in many instances, command a fair return upon the capital invested. This was emphasized in instances where mines were operated under lease and the royalty was reduced or the lease given up; and also by the Bessemer Ore Association in the early part of the year 1898 advancing the price of the Bessemer ores, other ores profiting proportionately by such increase.

The basis for the prices of Lake Superior ores for the present season (1898) has been fixed for the Bessemer ores of the Marquette, Menominee, and Gogebic ranges by the Bessemer Ore Association at an advance of 15 cents (5.66 per cent) per ton over the prices of 1897, the same ore (Norrie) being taken as a standard, and the basis price raised from $2.65 to $2.80 per ton.

The following table will show the total production and valuation of iron ore mined in the year 1897, by States, together with the average value per ton:

*Quantity and value at the mines of iron ore produced in 1897.*

| States. | Production. | Valuation. | Value per ton. |
|---|---|---|---|
| | *Long tons.* | | |
| Alabama | 2,098,621 | $1,546,543 | $0.74 |
| Colorado | 187,314 | 485,009 | 2.59 |
| Connecticut, Vermont, and Massachusetts | 22,573 | 56,141 | 2.49 |
| Georgia and North Carolina | 204,639 | 166,704 | .81 |
| Kentucky | 12,464 | 12,464 | 1.00 |
| Maryland | 11,500 | 23,000 | 2.00 |
| Michigan | 6,087,463 | 8,347,615 | 1.37 |
| Minnesota | 5,601,429 | 4,029,077 | .72 |
| Missouri | 600 | 600 | 1.00 |
| Montana, Nevada, New Mexico, Utah, and Wyoming | 39,956 | 67,922 | 1.70 |
| New Jersey | 254,235 | 491,838 | 1.93 |
| New York | 335,725 | 642,838 | 1.91 |

*Quantity and value at the mines of iron ore produced in 1897*—Continued.

| States. | Production. | Valuation. | Value per ton. |
|---|---|---|---|
| | *Long tons.* | | |
| Ohio | 54,417 | $64,235 | $1.18 |
| Pennsylvania | 723,742 | 851,079 | 1.18 |
| Tennessee | 604,497 | 479,485 | .79 |
| Texas | 13,588 | 10,870 | .80 |
| Virginia | 711,128 | 974,031 | 1.37 |
| Wisconsin | 554,155 | 703,770 | 1.27 |
| Total | 17,518,046 | 18,953,221 | 1.08 |

The values shown above represent what the ores mined in 1897 command at the mines—not necessarily the cost.

## STOCKS OF IRON ORE.

Notwithstanding the greatly increased production of iron ore, the stocks of ore on hand reported show a decline from 3,405,302 long tons in 1896 to 3,098,287 long tons on December 31, 1897, a decrease of 307,015 long tons, or 9.02 per cent. Apparently the iron industry consumed during 1897 the amount of this reduction of stock. In addition to the iron ores and zinc residuum mentioned, there entered into the manufacture of pig iron in 1897 about half a million tons of mill cinder, "blue billy," resulting from roasting pyrites, and some basic silicates of iron produced in smelting copper ores.

The largest stocks of ore, as in former years, were held in the States of Michigan, Minnesota, and Wisconsin, which form the Lake Superior region. The amount of ore sent forward from this region by all-rail routes to points of consumption was relatively small, practically the entire output last year being carried by water to lower lake ports, and as during the latter part of the year lake transportation ceases on account of the ice, the ore accumulates in the stock piles at the mines to await the opening of the shipping season in the spring. These immense stock piles are prominent topographic features during the early part of the shipping season. On account of the ore being wet with mine water or snow during cold weather, the piles often require blasting, even in midsummer, before the ore may be loaded on cars. At many of the mines steam shovels are employed for the purpose of loading the ore on railroad cars from the stock piles. In the Southern States, where the mines are as a rule close to the furnaces, the ores being shipped as mined by rail, there are but small stocks of ore on hand at the mines.

The stocks of ore on hand at the mines December 31, 1897, are given by States in the following table:

*Stocks of iron ore on hand December 31, 1897, by States.*

| State. | Long tons. |
|---|---|
| Alabama | 26,000 |
| Colorado | 10,300 |
| Connecticut, Massachusetts, and Vermont | 3,233 |
| Georgia and North Carolina | 5,950 |
| Kentucky | 14,538 |
| Maryland | 7,500 |
| Michigan | 1,310,145 |
| Minnesota | 855,855 |
| Missouri | 73,611 |
| Montana, Nevada, New Mexico, and Wyoming | 23,740 |
| New Jersey | 72,350 |
| New York | 142,279 |
| Ohio | 48,510 |
| Pennsylvania | 44,531 |
| Tennessee | 34,161 |
| Texas | 10,000 |
| Virginia | 6,420 |
| Wisconsin | 409,164 |
| Total | 3,098,287 |

Having considered the United States in general, the different States will be taken up in detail.

## IRON-ORE INDUSTRY IN VARIOUS STATES.

### MICHIGAN.

This State continues to head the list of iron-ore producers of the country, with a total for 1897 of 6,087,463 long tons of ore, all classed as the red hematite variety, with the exception of 45,866 long tons of magnetite. The output in 1896 was 5,706,736 long tons. In 1897, therefore, there was an increase of 380,727 long tons, or 6.67 per cent.

The position which Michigan has held is illustrated by the following figures of production in this State and the total for the United States during each year since 1889:

*Production of iron ore in Michigan since 1889.*

| Year. | Michigan. | United States. |
|---|---|---|
| | *Long tons.* | *Long tons.* |
| 1889 | 5,856,169 | 14,518,041 |
| 1890 | 7,141,656 | 16,036,043 |
| 1891 | 6,127,001 | 14,591,178 |
| 1892 | 7,543,544 | 16,296,666 |
| 1893 | 4,668,324 | 11,587,629 |
| 1894 | 4,419,074 | 11,879,679 |
| 1895 | 5,812,444 | 15,957,614 |
| 1896 | 5,706,736 | 16,005,449 |
| 1897 | 6,087,463 | 17,518,046 |

It is evident from this statement that the unprecedented low prices at which Lake Superior ores have been sold, and the large supply furnished from Minnesota mines in competition with that from Michigan, have not prevented liberal outputs from the older ranges.[1] The prices and competition have demanded cheaper mining costs, better transportation facilities, and reduced royalties. In this connection the following is introduced to indicate how royalties are affected:

One of the companies mining large amounts of ore, and holding liberal areas of land, has heretofore operated with a schedule based upon royalties of nominally 30 cents per ton for non-Bessemer ores, 40 cents for Bessemer, and 50 cents for high-grade Bessemer. A readjustment of the low prices now prevailing throughout the iron industry is in prospect.

A sliding scale is adopted, providing for a royalty of 7 cents per ton, on the basis of $1.49 or less for a ton of ore delivered at Lake Erie ports; 8 cents a ton on ore selling at $1.50 to $1.59; 9 cents royalty on prices from $1.60 to $1.69; 10 cents on prices from $1.70 to $1.79; 11 cents on prices from $1.80 to $1.89; 12 cents on prices from $1.90 to $1.94; and so on, with 1 cent increase in royalty for each additional 5 cents increase in price from $1.90 per ton. This makes a 20-cent royalty on ore bringing from $2.30 to $2.34; 30 cents royalty on ore from $2.80 to $2.84, and 33 cents royalty on ore from $2.95 to $2.99.

## MINNESOTA.

This State still holds second place, with a total of 5,601,429 long tons, an increase of 1,317,549 long tons, or 30.76 per cent over the product of 4,283,880 long tons in 1896.

All of this ore was of the red hematite variety. While the State

[1] Notes upon the Marquette Range appear on pages 54–58.

has been steadily advancing as a producer of iron ore, it is doubtful if it will win first place in 1898.

The marvelous strides taken by Minnesota will be evident from the following table:

*Production of iron ore in Minnesota from 1889 to 1897.*

| Year. | Quantity. | Year. | Quantity. |
|---|---|---|---|
| | *Long tons.* | | *Long tons.* |
| 1889 | 864,508 | 1894 | 2,968,463 |
| 1890 | 891,910 | 1895 | 3,866,453 |
| 1891 | 945,105 | 1896 | 4,283,880 |
| 1892 | 1,255,465 | 1897 | 5,601,429 |
| 1893 | 1,499,927 | | |

Until 1884 this State did not produce any iron ore, but it has shown a decided advance every year since, reaching its maximum in 1897.

The totals show that Minnesota, which until fourteen years ago contributed no iron ore, has mined in the interval 23,681,148 long tons. To obtain this, towns and villages have been located, several hundred miles of railroad built and equipped, and extensive shipping docks constructed. Most of this work has been done in what was previously an unbroken wilderness.

## ALABAMA.

Alabama maintained third place, with a production of 2,098,621 long tons in 1897, of which 1,738,583 long tons, or 82.84 per cent, consisted of red hematite, and 360,038 long tons, or 17.16 per cent, was brown hematite. The output of 1897 was 56,828 long tons, or 2.78 per cent greater than in 1896, when it was 2,041,793 long tons. A new discovery of brown hematite is reported in the Birmingham district, overlying the red hematite ore beds, and is said to be of large size and persistent.

The ores from Michigan, Minnesota, and Wisconsin find a market remote from the mines, but most of the ores extracted in Alabama are used locally. The production of this State therefore practically reflects the condition of its pig-iron industry.

For the years for which statistics have been collected the record of Alabama is:

*Product of iron ore in Alabama from 1889 to 1897.*

| Year. | Quantity. | Year. | Quantity. |
|---|---|---|---|
| | *Long tons.* | | *Long tons.* |
| 1889 | 1,570,319 | 1894 | 1,493,086 |
| 1890 | 1,897,815 | 1895 | 2,199,390 |
| 1891 | 1,986,830 | 1896 | 2,041,793 |
| 1892 | 2,312,071 | 1897 | 2,098,621 |
| 1893 | 1,742,410 | | |

The amount mined in 1897 was greater than in any previous year except 1892 and 1895.

The project of constructing a large steel plant to operate upon basic iron, made from Alabama ores, has progressed so far as to encourage the expectation of its accomplishment, with the effect of considerably increasing the demands upon the iron-ore mines of the State. The ores mined in Alabama are all of non-Bessemer grade, and hence the product of the blast furnaces using these ores has been confined to foundry and mill irons. If the manufacture of basic steel upon a large scale proves successful, the market for Alabama metal will be greatly broadened. Considerable foundry iron from southern furnaces has been exported in the last two years, and has found a market in various European countries, and in Canada, Mexico, and Japan. It is probable that this outlet for manufactured metal will continue an important factor in the operation of American blast furnaces.

A statement of the character of the iron ore deposits of Alabama appears on pages 58–63.

## PENNSYLVANIA.

This State produces all the four varieties of ore. The 1897 output of 723,742 long tons consisted of 441,556 long tons of magnetite, in which class it occupies first place, 256,573 long tons of brown hematite, 19,515 tons of red hematite, and 6,098 tons of carbonate ore. While the State showed a decline of 24,042 long tons, or 3.22 per cent, from the 747,784 long tons produced in 1896, it rose from fifth to fourth place, chiefly on account of a marked decline in the amount of ore mined in Virginia.

The greater portion of the output of Pennsylvania is supplied by one region, viz, the Cornwall Ore Hills, which in 1897 produced 419,468 long tons of magnetic ore; the small amount of carbonate mined comes from the western portion of the State, the red hematite is credited to the eastern central portion, and the brown hematite is won principally in the East Penn and Lehigh valleys and in the central section.

The State has large reserves of iron ore, but these are mostly of a grade which is now considered comparatively undesirable with rich Lake Superior ores delivered at blast furnaces at low cost. Some of these reserves may again be wrought if the exploitation is conducted on a liberal scale and the ores are brought to as high a standard of purity as is practicable. Taking the most favorable conditions, Lake Superior ores cost from 3 to 4 cents per unit of iron for transportation from the mines to the eastern Pennsylvania blast furnaces.

This does not include expense of mining or profit. It would therefore appear practicable to operate some of the Pennsylvania mines advantageously if the operations are carried forward with all possible economies and if local railroad rates permit the mines to obtain some advantage on account of the charge for long hauls of the Lake ores.

Compared with the former records of Pennsylvania, the figures for

1897 show a smaller production than any year in the past two decades, except 1893 and 1894.

*Iron ore production in Pennsylvania from 1889 to 1897.*

| Year. | Quantity. | Year. | Quantity. |
|---|---|---|---|
| | *Long tons.* | | *Long tons.* |
| 1889 | 1,560,234 | 1894 | 532,087 |
| 1890 | 1,361,622 | 1895 | 900,340 |
| 1891 | 1,272,928 | 1896 | 747,784 |
| 1892 | 1,084,047 | 1897 | 723,742 |
| 1893 | 697,985 | | |

## VIRGINIA.

Virginia occupied fifth place as a miner of iron ore. The 1897 product of the State was 711,128 long tons, a decrease of 148,338 tons, or 17.26 per cent, from the total of 859,466 tons in 1896. It was, however, the largest producer of brown hematite ore in the United States in 1897, the entire output of the State, with the exception of 13,570 long tons of red hematite ore, being of this variety.

The Virginia ores are of such chemical composition that the pig iron produced from them can not be used in the manufacture of steel by the Bessemer process, but some of the blast furnaces have produced metal for the manufacture of basic steel. The decrease in the iron-ore output of Virginia is directly traceable to the reduced production of pig iron in the State in 1897, for these blast furnaces depend upon local ores.

## TENNESSEE.

The iron ore production of this State increased 69,013 long tons, or 12.89 per cent, over that of 1896, the 1897 output being 604,497 long tons, against 535,484 long tons in 1896.

Of this, 343,947 long tons was brown hematite, and considerable quantities of this class of ore have been supplied regularly to the blast furnaces in northern Alabama.

## WISCONSIN.

The 554,155 tons of iron ore mined in this State in 1897 was all of the red hematite variety, being a decrease of 53,250 long tons, or 8.77 per cent, from the total of 607,405 tons in 1896. This was the only State in the Lake Superior region that showed a decline in output.

The red hematite ores are drawn from portions of the Gogebic and Menominee ranges of the Lake Superior region, and the Mineral Point district of eastern Wisconsin.

## NEW YORK.

This was the only State except Pennsylvania which mined all four varieties of ore; it produced 296,722 long tons of magnetite, 20,059 tons of brown hematite 11,280 tons of carbonate, and 7,664 tons of red hematite, making a total of 335,725 long tons, a decrease of 49,752 tons, or 12.91 per cent, from the product of 385,477 long tons in 1896. Like Pennsylvania this State has large reserves of ore, the magnetite being as a rule richer than those obtained in the former State, but the ore from the Lake Superior region has greatly restricted the market for New York magnetite, and in many instances has caused some of the mines to close down. The magnetite, as before stated, is not so much desired by blast furnace managers as red hematite of similar chemical composition. The carbonate and brown hematite are mostly utilized in the southeastern portion of the State in the manufacture of some special pig iron, for which there is limited but constant demand.

Large sums have been invested in the construction of a basic steel plant at Troy, with the purpose of using the highly phosphorous magnetites of the Lake Champlain district, and if this enterprise proves successful increased production from New York will be chronicled.

## NEW JERSEY.

The product of 254,235 long tons in 1897 was all of the magnetite variety, and shows a decline of 10,764 tons, or 4.06 per cent, from that of 1896, which amounted to 264,999 tons. The increased depth and expense of mining, together with the competition of the Lake Superior and foreign ores, have combined to restrict the New Jersey production, and several prominent mines have closed down since the last report was issued. In fact, over one-third of the total for the State, 99,033 tons, was produced by one mine, the Richards.

Efforts to work mines of limited width and produce a small daily output will, unless the ore is of exceptionally good quality, prove unprofitable in the present state of the iron industry. By combination of interests, by working mines to their capacity, and by introducing economies, some of the New Jersey deposits now idle might again be made productive.

Several attempts to concentrate lean ores magnetically have been made on a liberal scale in central New Jersey, and large amounts of money have been invested in these enterprises. The output, however, of concentrated ore has so far been inconsiderable. One of the important concentrating plants was destroyed by fire and thus removed from the list.

## GEORGIA AND NORTH CAROLINA.

Two varieties of ore were mined in 1897, viz, 131,540 tons of red hematite and 73,099 tons of brown hematite. The total, 204,639 tons, was an increase of 29,308 tons, or 16.72 per cent, over 1896. The magnetite mines of North Carolina were not worked in 1897.

## COLORADO.

A decided reduction in the quantity of pig iron produced and the suspension of operations at some of the silver mines of Colorado are responsible for the small amount of iron ore mined during 1897—187,314 long tons as compared with 215,819 long tons in 1896, a decline of 28,505 tons or 13.21 per cent.

## OTHER STATES.

Of the remaining States Ohio produced 54,417 long tons of carbonate ore, which was smelted in local furnaces. The output of the Western States of Montana, Nevada, New Mexico, Utah, and Wyoming was used as flux in the smelting of the precious metals. In Connecticut and Massachusetts brown hematites were employed in the production of charcoal pig iron. The amounts mined in Texas, Kentucky, Missouri, and Maryland were used in local furnaces.

## PROMINENT IRON ORE PRODUCERS.

The year 1897 was the banner year for the larger operators; 73 mines or groups of mines produced 15,002,583 long tons of iron ore, or 205,515 long tons on the average. The combined output of these 73 plants was 85.64 per cent of the total production for the year. The largest average output, except in 1897, was in 1895, when 84.01 per cent of the total iron ore mined was obtained from 72 of the larger mines.

One of these 73 producers in 1897 contributed over 700,000 long tons; 1 between 600,000 and 700,000 long tons; 7 between 500,000 and 600,000 long tons; 5 between 400,000 and 500,000 tons; 2 between 300,000 and 400,000 tons; 8 between 200,000 and 300,000 tons; 20 between 100,000 and 200,000 tons, and 29 between 50,000 and 100,000 tons. Of these large mines 29 were located in Michigan, 17 in Minnesota, 8 in Alabama, 5 in Tennessee, 3 each in New Jersey, Virginia, and Wisconsin, 2 each in Pennsylvania and New York, and 1 in Georgia.

Of these mines 56 produced red hematite, with a total of 13,217,094 long tons. Six mines supplied 833,766 long tons of magnetite, 10 contributed 814,124 tons of brown hematite, and the remaining mine yielded a mixture of red hematite and magnetite. The average of the red hematite mines was 236,220 long tons each, of the magnetite 138,961 tons, and of the brown hematite 81,412 tons.

Forty-nine of the important producers are located in the Lake Superior region, divided as follows:

| | |
|---|---|
| In the Mesabi Range | 14 |
| In the Marquette Range | 12 |
| In the Menominee Range | 10 |
| In the Gogebic Range | 10 |
| In the Vermilion Range | 3 |
| Total | 49 |

The table following indicates by name the principle mines with their outputs in 1897, where the management did not object to such publication. The remaining 19 are grouped at the end of the statement. It is truly a remarkable list and one which can be duplicated in no other country.

*Iron ore product by mines in the United States yielding 50,000 tons or more during 1897.*

| Name of mine. | State. | Product. |
|---|---|---|
| | | *Long tons.* |
| Mountain Iron and Rathbun | Minnesota | 773,538 |
| Lone Jack and Missabe Mountain | do | 601,072 |
| Chandler | do | 586,353 |
| Fayal | do | 565,600 |
| Alice, Fossil, Muscado, Redding, Wares (group) | Alabama | 565,395 |
| Metropolitan Land and Iron Co.: | | |
| Norrie | Michigan 222,088 | |
| North Norrie | do 180,520 | |
| East Norrie | do 158,578 | |
| | | 561,186 |
| Pittsburg and Lake Angeline | do | 521,100 |
| Mahoning | Minnesota | 519,892 |
| Minnesota Iron Co. (group) | do | 502,738 |
| Ishkooda and Spalding | Alabama | 457,568 |
| Biwabik | Minnesota | 427,464 |
| Cornwall | Pennsylvania | 419,468 |
| Lake Superior | Michigan | 409,883 |
| Cleveland Iron Mining Co.: | | |
| Hard Ore | do 12,428 | |
| Lake | do 392,206 | |
| | | 404,634 |
| Chapin | do | 354,559 |
| Genoa | Minnesota | 316,318 |
| Pewabic | Michigan | 278,627 |
| Pioneer | Minnesota | 251,370 |
| Penn Mining Co. | Michigan | 232,479 |
| Ludington | do | 222,600 |
| Queen Mining Co | do | 216,072 |
| Montreal | do | 202,647 |
| Hull | Minnesota | 192,601 |
| Sloss | Alabama | 192,076 |
| Pabst | Michigan | 186,997 |
| Negaunee | do | 186,310 |
| Adams | Minnesota | 171,247 |
| Brown Mining Co. | Tennessee | 163,641 |

*Iron ore product by mines in the United States, etc.*—Continued.

| Name of mine. | State. | Product. |
|---|---|---|
| | | *Long tons.* |
| Auburn | Minnesota | 145,545 |
| Newport | Michigan | 141,369 |
| Champion | do | 137,599 |
| Salisbury | do | 131,819 |
| Lawrence | Tennessee | 126,552 |
| Republic and West Republic | Michigan | 124,491 |
| Port Henry Iron Ore Co., No. 21 | New York | 116,438 |
| Irondale | Alabama | 116,196 |
| Lillie | Michigan | 112,781 |
| Aragon | do | 112,000 |
| Cambria | do | 110,648 |
| Richard | New Jersey | 99,033 |
| Commonwealth and Badger | Wisconsin | 97,000 |
| Crystal Falls | Michigan | 95,210 |
| Norman | Minnesota | 91,666 |
| Jackson | Michigan | 88,700 |
| Greeley | Alabama | 86,546 |
| Scotia | Pennsylvania | 83,000 |
| Embreville Iron Co., Limited | Tennessee | 79,400 |
| Atlantic | Wisconsin | 75,303 |
| Dolly Ann | Virginia | 71,124 |
| Tecumseh, including State Line and Baker. | Alabama | 70,000 |
| Sparta Iron Co | Minnesota | 66,721 |
| Ohio | do | 52,957 |
| Inman | Tennessee | 52,709 |
| Champion | Alabama | 51,724 |
| Total | | 13,019,966 |
| 19 mines not reported by names | | 1,982,617 |
| Grand total | | 15,002,583 |

## MINING METHODS.

Iron-ore deposits in the United States differ materially in character, and the geological and physical conditions of the several varieties generally recognized as magnetite, red hematite, brown hematite, and carbonate ores require methods of exploitation which vary greatly. The known character, the apparent dimensions, the general form, and the position of an iron-ore deposit, with reference to the surface and water, the physical structure or chemical composition of the material to be

extracted, the character of the earth or rock inclosing or occurring in the ore body, the stratification, dip, and strike, the simplicity or complexity of the ore body, the convenience of the deposit to an available market for its product, and the capital at command of those who attempt the exploitation, all influence the methods followed in mining iron ore.

While a detailed description of the various practices followed in specific localities and in different deposits will not be attempted, it has been considered advisable to offer some general data upon iron-ore mining as practiced in the United States, and to present illustrations of a few of the problems with which those engaged in the industry have to contend.

Where the ore body projects above or lies close to the surface, or where in a large apparently well defined deposit the cover can be stripped to advantage, the exploitation may be carried on by open-cut work, from which the ore is taken out either by train, as illustrated by Pls. II and IV, or after digging lifted by steam power applied to inclines or to vertical hoists, as shown on Pls. VI and VIII.

Where the body of ore is under considerable cover, if the roof is firm, or if the vein matter is comparatively narrow and dips at steep angles from the horizon, it is removed through shafts, either vertical or inclined, and through tunnels or adits. In a number of instances open-cut work has, after reaching a considerable depth, been supplemented by underground exploitation, as shown in Pl. III, while in a few cases, one of which is shown in Pl. I, this method was reversed, and a large open cut supplanted underground work. The shafts or adits, which are generally expected to serve as long as the deposit yields ore, are necessarily costly and need to be planned and located with care, for through these the miners have access to the underground workings, and the ore and water are carried through them to the natural surface.

Except when the strata penetrated is exceptionally compact and hard, the shafts or adits must be substantially timbered, so that they can be maintained until the deposit is exhausted, and they are excavated either in the ore or in inclosing rock, and if in the ore large bodies are left adjacent to these avenues of approach as a safeguard against accident.

From these main arteries drifts are opened either parallel or at different angles in wide or shallow deposits, or at determined depths in narrow and deep deposits, and from these in turn supplementary drifts are run and rooms or stopes excavated. In deposits dipping considerably from the horizon, one prevailing method of exploitation is to open a series of drifts at different levels, from which mining is carried on simultaneously; the upper levels are farther advanced than those below, the ore being taken out in horizontal sections, or slices, known in mining parlance as stopes. When the ore is worked above a given level and allowed to fall by gravity, through chutes or otherwise, to vehicles which deliver it to the main arteries, the method is called

TILLY FOSTER MINE, NEW YORK, SHOWING CONCRETE ARCHES FROM FOOT TO HANGING WALL AFTER ROOF HAD BEEN REMOVED (MAGNETITE)

CORNWALL ORE HILLS, PENNSYLVANIA, SHOWING THROUGH CUT IN ORE (MAGNETITE).

NO 21, PORT HENRY MINE, NEW YORK, SHOWING ORE PILLARS AND INCLINED SKIP-WAY LEADING FROM OPEN PIT INTO UNDERGROUND WORKINGS (MAGNETITE).

BIWABIK MINE, MINNESOTA; STRIPPING AND DIGGING ORE BY STEAM SHOVEL FROM OPEN PIT (RED HEMATITE).

SCRAMMERS IN CAVING SYSTEM (RED HEMATITE MINE).

OPEN PIT, NOW ABANDONED, OF LAKE SUPERIOR (HEMATITE) MINE, MARQUETTE RANGE, SHOWING POWER HOUSE, HEAD HOUSES, AND SKIP ROADS LEADING TO UNDERGROUND WORKINGS.

FILLING SYSTEM, MINNESOTA IRON COMPANY, MINNESOTA, WITH CHUTE FOR DISCHARGING REFUSE FROM UPPER LEVELS (HARD RED HEMATITE).

CRATERS MADE BY THE MILLING SYSTEM AT AUBURN MINES (RED HEMATITE), MINNESOTA, BY DRAWING THE ORE FROM BELOW, THROUGH DRIFTS AND RAISES

SLICING SYSTEM, FAYAL MINES, MINNESOTA, SHOWING MINE PROPS AND CAPS IN POSITION.

ELECTRICAL MOTOR USED IN THE LAKE SUPERIOR REGION, SHOWING GANGWAY TIMBERING, PITTSBURG AND LAKE ANGELINE MINE, MARQUETTE RANGE.

DRILLING ROOF IN HARD ORE MINE, MARQUETTE RANGE, MICHIGAN.

"overhand stoping". Where the material is attacked below a level and the ore raised to this level, the method is recognized as "underhand stoping". The overhand system is, under most circumstances, the cheaper and most advantageous, but the underhand stoping is necessary in taking up floors, removing pillars, and in some open-cut work.

In underground operations the space made void as the ore is removed must be filled, at least in part, either by timbering or by rock or other waste material. In many instances the ore, if left in pillars alternating with rooms or stopes, will safely support the roof, but often the proportion of ore necessarily so left is too great to make this method desirable.

After shafts or adits have been sunk and main drifts run, the ore is taken out by various systems, which may be briefly designated as follows:

"Milling," in which the surface earth is removed and the ore drawn through "raises" into drifts located some distance below the top of the ore, making in this way large sinks or craters. This system requires that the cover be stripped, and is specially adapted to shallow deposits of soft ore. Pl. VIII illustrates the milling system.

In "caving," a series of levels connecting with the main shaft or several shafts are simultaneously worked, the ore being taken out from the upper levels and delivered through winzes to lower levels which are protected by the ore "in situ."

As the ore is removed from the portion of one level, the superincumbent rock or earth is allowed to cave upon the ore below, and frequently the material is encouraged to settle by the use of explosives. By this method but little ore need be left in a deposit, and if care is exercised the risks are not great and but little waste becomes mixed with the ore. This method is applied more to soft or moderately soft ores than to those which are harder, but it is used in some hard-ore mines where the roof or hanging wall is insecure. (See Pl. V.)

"Drifting" is employed in all underground mining, but where a series of parallel drifts, one advanced more than another, are employed to slice off the deposit, the method is recognized as the "drifting or slicing system." (See Pl. IX.)

"Room mining" may be considered either as digging out cavities which alternate with pillars, or as opening cavities of considerable length, width, and height, usually from foot wall to hanging wall, and supporting the last-named and the roof by an elaborate arrangement of timbers known as square sets, in which the timbers are so placed as to form the outlines of a series of cubes resting upon one another. This method is liberally employed in removing soft hematite, and some of the cavities thus made and protected are of enormous size.

"Filling" is not so truly a method of mining as a means of protecting the workings by depositing in the cavities waste rock, sand, etc. It is often more economical than introducing timber support, and is adapted to hard-ore mines. This method is illustrated by Pl. VII.

The magnetites, as a rule, are found in fairly well-defined veins

inclosed between walls and dipping at steep angles from the horizon. Some of these veins are of enormous size, as in the Lake Champlain district of New York, where the texture and hardness of the ore permit of its use as pillars in the mines. Other veins are narrow and tortuous, although persistent, and each of these characteristics demands a different method of exploitation.

Where magnetic iron ore is obtained from underground operations the ore left as pillars generally furnishes sufficient support for the roof, but there are instances, as in the Tilly Foster mine, New York, where the proportion of the total ore in the deposits which these pillars represented or the tendency of the mineral to break from the pillars in large masses caused their abandonment. A subsequent attempt to recover the pillars by introducing artificial support of concrete carried in brick arches proved unsatisfactory, and the entire roof was removed and transformed into an open cut, as shown by Pl. I, which exhibits a portion of the concrete support and the arches under it.

The ore from the Tilly Foster mine is hard, and a portion of that won is not rich enough in iron for use in blast furnaces without beneficiation, so that the leaner mineral is crushed and passed over magnetic separators to enrich it. The chemical composition of the ore, as exhibited by analysis, places it in the Bessemer limit and also in the class of self-fluxing ores, that of the shipping ores being as follows:

*Analysis of Tilly Foster shipping ore.*

| Constituent. | Per cent. |
|---|---|
| Oxides of iron | 67.42 |
| Oxides of manganese | .54 |
| Alumina | 3.85 |
| Lime | 1.44 |
| Magnesia | 13.30 |
| Sulphur | .11 |
| Phosphoric acid | 0.128 |
| Silica | 13.23 |
| Total | 100.018 |
| Metallic iron | 48.82 |

The leaner ore, which was sent to the concentrator, contained from 24.8% per cent to 28.57 per cent of iron, while the concentrates made therefrom show from 47.40 per cent to 51.04 per cent of iron.

The deposit of the magnetic class of ore which contributes the largest amount to the iron-ore supply of the United States, that at Cornwall, Pennsylvania, is mined as a great open cut, the ore being moderately soft. The ore in the Cornwall deposit was found in a large [illegible] forming the major portion of the three hills, which has been worked since 1740, and has produced to date 14,000,000 long tons of

ore. The average annual output for the past decade has been 600,000 long tons; the maximum yearly production, 769,000 long tons, was in 1889. This deposit is of moderate richness, is of Bessemer grade, and carries some copper and such quantity of sulphur as to require that it be roasted prior to being smelted. A fair average analysis of selected Cornwall ore as mined is:

*Analysis of raw Cornwall iron ore.*

| Constituent. | Per cent. |
|---|---|
| Metallic iron | 48.800 |
| Metallic manganese | .057 |
| Metallic copper | .599 |
| Alumina | 2.315 |
| Lime | 4.330 |
| Magnesia | 5.531 |
| Sulphur | 1.807 |
| Phosphorus | .018 |
| Silica | 12.940 |
| Phosphorus, 100 parts iron | .063 |

Pl. II exhibits a cut into the ore deposit of one of the Cornwall ore hills.

These three hills have been practically removed in mining less ore than the United States produced in 1897, but, making allowances for the smaller amount of rich ore required, the impressive excavations at Cornwall give some intimation of the enormous quantity represented by the 17,518,046 long tons of iron ore which the country produced in 1897. Mining is now generally below surface, but is still in the open.

## HANDLING AND SHIPPING LAKE SUPERIOR ORES.

Previous reports have shown how the handling of iron ores has resulted in perfecting docks for shipping and receiving ore, with handling appliances for the docks, and in securing a fleet of superb modern vessels for transporting the ores upon the Great Lakes. The shipping docks, the number of pockets for ore in each, their capacity, and cost have already been given in detail.

To provide for the augmented output and to meet the competition of different ranges the transportation facilities for iron ore on the Great Lakes have been improved. The only shipping ports at which new piers or extensions were not reported during the winter of 1897 are Gladstone and Marquette, but at the latter port there is the new dock on the Lake Superior and Ishpeming Railroad, which was finished in 1896.

The Duluth and Iron Range Railroad has rebuilt its dock No. 2 at Two Harbors, at a cost of over $250,000. The Duluth, Missabe and

Northern Railway has extended its pier No. 2, at a cost of $200,000. The Duluth, Superior and Western Railway has made some improvements at its piers at Allouez Bay, on Lake Superior, and the Chicago and Northwestern Railway has expended nearly a quarter of a million dollars in betterments to its piers and docks at Ashland.

In the new additions to the fleet of ore vessels there was no great increase in the size of the boats for the year 1896–97 over that of 1895–96, but there was a considerable difference in 1897–98 over the previous year. In the fall of 1895 a draft of but 14½ feet was available, increasing to 16 feet in the early part of 1896–97, and reaching 17 feet 4 inches in the latter part of the year. The following table taken from the Iron Age will give a good idea of the size, capacity, and value of vessels constructed in the years named:

*Capacity of vessels of the lake fleet.*

| Year and class. | Dimensions. | Capacity. | Draft. | Value. |
|---|---|---|---|---|
| 1895–96. | | *Tons.* | *Feet.* | |
| Steel freight steamer | 438 by 45½ by 28 | 4,000 | 14½ | $270,000 |
| Do | 452 by 48 by 28 | 4,000 | 14½ | 270,000 |
| Steel freight barge | 360 by 44 by 26 | 4,000 | 14½ | 135,000 |
| 1896–97. | | | | |
| Steel freight barge | 380 by 44 by 26 | 4,900 | 16 | 130,000 |
| Steel freight steamer | 426 by 406 by 48 by 28 | 5,000 | 16 | 240,000 |
| Steel freight barge | 388 by 376 by 46 by 26 | 5,000 | 16 | 150,000 |
| 1897–98. | | | | |
| Steel freight steamer | 475 by 452 by 50 by 28 | 6,100 | 17 | 255,000 |
| Steel tow barge | 450 by 434 by 50 by 28 | 7,000 | 17 | 155,000 |
| Steel freight steamers | 450 by 430 by 50 by 28 | 6,000 | 17 | 235,000 |

Of the boats contracted for in 1897, 7 steamers and 7 barges are intended for the freight trade. The aggregate value of the 14 vessels is $2,425,000, and the combined capacity is 72,900 tons on a draft of 17 feet. All but 4 of these boats are of steel. Sixteen vessels were lost during the season of 1897, the value being $358,500 and the tonnage 11,541, but none of these was of the modern type.

Improvements were also made at the receiving docks at Lower Lake ports, particularly at Conneaut, Ohio, the Lake terminus of the Pittsburg, Bessemer and Lake Erie Railroad, where a new pier was constructed and the old ones improved. The latter part of the year 1897 witnessed the formal opening of the Pittsburg, Bessemer and Lake Erie Railroad, from Conneaut, Ohio, to Duquesne, Pennsylvania. This road was built specially for the iron-ore carrying business, and is controlled by the Carnegie Steel Company. The road is built in a sub-

stantial manner, the grades being made as light as practicable and the line laidwith 100-pound rails. In addition to the wooden gondola cars 1,000 steel cars are to be used, each capable of carrying 100,000 pounds.

The storage docks at Conneaut are equipped with ore conveyors and in the winter of 1897 the McMyler Manufacturing Company installed some rapid ore-unloading machines, capable of handling 800 tons per hour. The plant is arranged for direct transfer from the boats into cars. It consists of 12 legs divided into 4 groups of 3 machines, each running on a 20-foot track; the outer legs of each group may be moved from a 21-foot center to a 36-foot center, thus accommodating the legs to any difference between the vessel hatches. Each leg spans 5 railroad tracks, 2 being under the machine and 3 under the cantilever. On the water side the boom extends to the farther side of the vessel, which permits lifting the buckets perpendicularly, and also of operating more than one bucket at a hatch. The trolley can be stopped and lowered at any point without going into a lock over the vessel's hatch. The buckets dump automatically at any height above the cars on any of the 5 tracks.

The handling of coal to and from vessels has received careful study and by the magnificent dock equipments established for this purpose cheap return cargoes are quickly loaded and unloaded, thus reducing the cost of ore transportation and permitting the wide distribution of the mineral won in the Lake Superior region at rates which were considered impossible a few years ago.

The shipments of iron ore from the various ports on the Upper Lakes for the year 1897 and the preceding five years, according to the Iron Trade Review, are as follows:

*Lake shipments of iron ore.*

| Port. | 1897. | 1896. | 1895. | 1894. | 1893. | 1892. |
|---|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Two Harbors ... | 2,651,465 | 1,813,992 | 2,118,156 | 1,373,253 | 903,329 | 1,165,076 |
| Duluth ..... | 2,376,064 | 1,988,932 | 1,598,783 | 1,369,252 | 440,592 | ..... |
| Escanaba..... | 2,302,121 | 2,321,931 | 2,860,172 | 1,644,776 | 2,048,681 | 4,010,085 |
| Ashland ..... | 2,067,637 | 1,566,236 | 2,350,219 | 1,738,590 | 1,117,520 | 2,223,684 |
| Marquette..... | 1,945,519 | 1,564,813 | 1,079,485 | 1,424,850 | 1,086,934 | 1,026,338 |
| Superior..... | 531,825 | 167,245 | 117,884 | ..... | 80,273 | 4,245 |
| Gladstone ..... | 341,014 | 220,887 | 109,211 | 79,108 | 203,589 | 115,886 |
| Total..... | 12,215,645 | 9,644,036 | 10,233,910 | 7,629,829 | 5,880,918 | 8,545,314 |
| All rail..... | 241,357 | 290.792 | 195,127 | 118,394 | 178,037 | 525,768 |
| Total..... | 12,457,002 | 9,934,828 | 10,429,037 | 7,748,223 | 6,058,955 | 9,071,082 |

From the above table it will be seen that for the first time in recent years Escanaba, Michigan, on Lake Michigan, has been superseded as

the leading shipping port, and has been passed by Two Harbors and Duluth, both in Minnesota and on Lake Superior. This is due in part to the operation of the new Lake Superior and Ishpeming Railroad, which diverted a considerable amount of ore from mines to Marquette, Michigan, that heretofore had been shipped to Escanaba.

The relatively small amount of ore shipped by rail direct from the mines is used principally by blast furnaces within convenient distances of the ore deposits.

## STOCKS OF ORE AT LOWER LAKE PORTS.

The greater portion of the ore mined in the Lake Superior region is sent to Lower Lake ports by vessels, and, according to the Cleveland Iron Trade Review, the iron-ore receipts for the last six years were as follows at the ports named:

*Iron-ore receipts at Lake Erie ports.*

| Ports. | 1897. | 1896. | 1895. | 1894. | 1893. | 1892. |
|---|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Ashtabula | 3,001,914 | 2,272,822 | 2,474,791 | 1,987,722 | 1,845,738 | 2,555,416 |
| Cleveland | 2,456,704 | 2,313,170 | 2,312,370 | 1,624,573 | 1,260,716 | 1,950,224 |
| Fairport | 1,008,340 | 941,446 | 914,617 | 976,222 | 792,517 | 866,611 |
| Erie | 1,311,526 | 847,849 | 811,989 | 624,438 | 469,299 | 645,230 |
| Buffalo (*a*) and Tonawanda | 797,446 | 545,101 | 719,742 | 395,339 | 308,238 | 197,000 |
| Conneaut | 495,327 | 327,623 | 244,967 | 237,905 | 203,207 | 1,130 |
| Toledo | 416,438 | 301,794 | 260,730 | 158,384 | 145,515 | 139,987 |
| Lorain | 355,188 | 191,445 | 214.219 | 150,424 | 165,667 | 190,400 |
| Huron | 198,231 | 226,515 | 146,442 | 172,775 | 137,700 | 65,000 |
| Sandusky | 79,792 | 58,667 | 12,361 | 23,043 | 4,464 | 49,736 |
| Total | 10,120,906 | 8,026,432 | 8,112,228 | 6,350,825 | 5,333,061 | 6,660,734 |

*a* Buffalo alone in 1892.

Ashtabula regained first position as a receiving port for iron ores, having been slightly superseded by Cleveland in 1896. Erie shows a marked advance, as also Lorain, Buffalo, and Conneaut.

The difference between the receipt at Lake Erie ports, 10,120,906 long tons, and the shipments from Upper Lake ports, 12,215,645 long tons, represents the shipments by water to South Chicago, Bay View, and a few of the Lake Superior and Detroit charcoal furnaces, the total being 2,094,739 long tons.

The stocks of ore carried at Lower Lake ports are a prominent factor in the iron-ore business. Large stocks, accumulated during the shipping season, are held over for the resumption of navigation. These are

decreased by rail shipments to the furnaces in the winter and spring months, when navigation is suspended. The following table shows the stocks of ore on hand at the Lower Lake ports on December 1, 1895, 1896, and 1897, and at the opening of navigation, May 1, 1896, 1897, and 1898:

*Stocks of iron ore at Lower Lake ports.*

| Port. | At close of navigation, December 1. | | | At opening of navigation, May 1. | | |
|---|---|---|---|---|---|---|
| | 1895. | 1896. | 1897. | 1896. | 1897. | 1898. |
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Ashtabula | 1,301,302 | 1,441,666 | 1,835,694 | 636,254 | 926,865 | 1,031,441 |
| Cleveland | 1,200,792 | 1,419,311 | 1,478,355 | 506,693 | 979,705 | 853,776 |
| Fairport | 605,470 | 773,905 | 825,312 | 346,847 | 480,984 | 501,592 |
| Erie | 335,718 | 355,222 | 484,871 | 137,826 | 153,261 | 236,485 |
| Conneaut | 292,460 | 275,800 | 360,895 | 112,406 | 207,034 | 69,047 |
| Lorain | 224,264 | 231,288 | 317,509 | 118,820 | 180,605 | 158,757 |
| Buffalo | 207,199 | 82,267 | 111,660 | 16,644 | 50,477 | 53,081 |
| Toledo | 113,132 | 115,959 | 194,644 | 10,593 | 66,337 | 71,726 |
| Huron | 101,000 | 200,075 | 230,029 | 55,173 | 162,292 | 143,170 |
| Sandusky | 34,375 | 59,491 | 84,786 | 8,442 | 48,937 | 48,800 |
| Total | 4,415,712 | 4,954,984 | 5,923,755 | 1,949,698 | 3,256,497 | 3,167,915 |

From this it will be seen that the stock of iron ore on dock at the close of the shipping season of 1897 was the largest yet reported, 5,923,755 long tons, and that it had been reduced to 3,167,915 long tons by May 1; the difference, 2,755,840 long tons, being the rail shipments to furnaces from docks during the winter of 1897–98.

The total shipments from Lake Erie ports to furnaces, together with the consumption by the furnaces at Tonawanda, Buffalo, and Cleveland, which receive ore directly into their yards from vessels, was as follows:

*Total shipments from Lower Lake ports to furnaces.*

| Year ending— | Quantity. | Year ending— | Quantity. |
|---|---|---|---|
| | *Long tons.* | | *Long tons.* |
| May 1, 1898 | 10,209,488 | May 1, 1894 | 4,840,488 |
| May 1, 1897 | 6,719,633 | May 1, 1893 | 6,102,125 |
| May 1, 1896 | 8,805,510 | May 1, 1892 | 5,802,496 |
| May 1, 1895 | 6,297,215 | May 1, 1891 | 5,148,669 |

This is an advance over the greatest previous total, May, 1896, of 1,403,978 long tons, or 15.94 per cent.

## ANALYSES OF LAKE SUPERIOR ORES.

The Bessemer Ore Association has published tables showing the average cargo analyses of the ores shipped by the various Lake Superior mines in the season of 1897, by ranges. Some of the mines give the analysis which the ore is expected to average during the year 1898. As similar data in the report of 1896 were well received, these analyses are presented in form to preserve as records.

*Analyses of Lake Superior ores.*

[Bessemer Association.]

GOGEBIC RANGE.

| Ore. | Iron. | Silica. | Phosphorus. | Manganese. | Alumina. | Lime. | Magnesia. | Sulphur. | Organic and volatile matter. | Moisture. |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* |
| Anvil (a) | 62.74 | 4.09 | .055 | .82 | .92 | .47 | .11 | .018 | 2.25 | 12.36 |
| Anvil, East Vein (a) | 61.00 | 5.25 | .058 | 2.18 | .86 | .05 | Trace | .014 | ..... | 12.75 |
| Atlantic (a) | 62.79 | 4.165 | .044 | 1.0390 | 1.1055 | .1950 | .1050 | .0152 | 3.026 | 11.00 |
| Ashland (a) | 62.69 | 4.50 | .035 | .25 | 2.11 | .12 | .10 | .026 | ..... | 11.00 |
| Aurora (a) | 62.44 | 5.19 | .028 | .44 | 1.10 | .10 | .05 | .020 | ..... | 10.00 |
| Buckeye | 60.43 | 6.24 | .078 | .36 | 2.10 | .40 | .35 | .014 | ..... | 10.82 |
| Best (a) | 56.17 | 10.440 | .057 | .7150 | 1.2400 | .2150 | .1525 | .0230 | 3.1650 | 12.91 |
| Brotherton | 62.51 | 7.50 | .035 | .42 | 1.20 | .10 | .05 | .01 | 1.30 | 12.27 |
| Cary Manganese | 56.08 | ..... | .056 | 6.52 | ..... | ..... | ..... | ..... | ..... | 10.06 |
| Cary Empire | 59.90 | ..... | .057 | 3.08 | ..... | ..... | ..... | ..... | ..... | 9.34 |
| Colby | 57.20 | 3.61 | .075 | 5.85 | .98 | .14 | .40 | .008 | 2.10 | 9.00 |
| Cromwell (a) | 60.00 | 3.75 | .032 | 3.10 | .75 | .10 | .13 | .010 | ..... | 9.58 |
| Eureka (a) | 61.65 | 6.75 | .066 | 1.40 | .95 | .52 | .22 | .011 | 1.97 | 9.80 |
| Iron Belt | 62.95 | 5.05 | .040 | .44 | 1.05 | .07 | .08 | .018 | ..... | 10.65 |
| Lawrence (a) | 62.00 | 5.70 | .057 | .56 | 1.25 | .10 | .08 | .009 | ..... | 9.78 |
| Melrose (a) | 62.92 | 3.15 | .030 | 1.00 | .93 | .05 | .08 | .013 | ..... | 9.88 |
| Montreal | 65.36 | 3.40 | .040 | .30 | 1.09 | .15 | .07 | .015 | ..... | 8.48 |
| Mikado | 59.15 | ..... | .044 | ..... | ..... | ..... | ..... | ..... | ..... | 13.00 |
| Newport (a) | 56.00 | 3.12 | .040 | 7.00 | .77 | .08 | .06 | .011 | ..... | 9.94 |
| New Era (a) | 58.00 | 9.60 | .030 | 1.50 | 1.23 | .43 | .16 | .005 | ..... | 10.50 |
| Norman (Palms) | 62.807 | 2.990 | .0730 | .8850 | 1.1500 | .2150 | .1600 | .0135 | 3.5550 | 13.19 |
| Norrie and Pabst | 63.88 | ..... | .039 | ..... | ..... | ..... | ..... | ..... | ..... | 10.31 |
| O'Brien | 58.98 | 12.50 | .101 | ..... | ..... | ..... | ..... | ..... | ..... | 13.85 |
| Palms (a) | 63.03 | 3.162 | .050 | .8434 | 1.0952 | .1550 | .1347 | .0125 | 3.3625 | 12.91 |
| Pearce (a) | 58.60 | 11.44 | .062 | .64 | .81 | .22 | .13 | .014 | 2.07 | 7.60 |
| Rand | 58.57 | ..... | .036 | 3.67 | ..... | ..... | ..... | ..... | ..... | 9.95 |
| Shores (a) | 65.00 | ..... | .025 | ..... | ..... | ..... | ..... | ..... | ..... | 5.97 |
| Sunday Lake | 63.00 | 8.60 | .0265 | .39 | .90 | .36 | .14 | .010 | .82 | 10.54 |
| Tilden | 63.19 | ..... | .045 | .88 | ..... | ..... | ..... | ..... | ..... | 13.87 |
| Toronto (a) | 49.00 | 26.00 | .045 | .45 | 1.25 | .40 | .25 | .015 | ..... | 8.50 |

*a* Expected analysis for 1898.

*Analyses of Lake Superior ores*—Continued.

MARQUETTE RANGE.

| Ore. | Iron. | Silica. | Phosphorus. | Manganese. | Alumina. | Lime. | Magnesia. | Sulphur. | Organic and volatile matter. | Moisture. |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* |
| Angeline, Hard | 66.30 | 2.50 | .012 | .15 | 1.75 | .15 | .04 | .015 | .60 | 5.19 |
| Angeline, Hematite | 64.40 | 2.65 | .043 | .20 | 1.30 | .25 | .08 | .020 | 2.20 | 10.08 |
| Barnum (*a*) | 65.50 | 3.49 | .075 | .36 | 1.80 | .32 | .26 | .026 | ..... | .89 |
| Bell | 43.875 | 34.000 | .0340 | .1710 | .8880 | .1250 | .0820 | .0290 | 1.5200 | 2.71 |
| Blue (*a*) | 63.40 | 5.20 | .12 | .25 | 1.96 | .55 | .72 | .010 | ..... | 10.50 |
| Buffalo (*a*) | 61.80 | 6.60 | .13 | .55 | 1.84 | .86 | 1.16 | .003 | ..... | 13.50 |
| Buffalo, South (*a*) | 61.95 | 5.70 | .115 | .39 | 1.75 | .92 | .71 | .005 | 1.70 | 10.90 |
| Cambria | 61.60 | 6.90 | .049 | .38 | 1.87 | .97 | .34 | .009 | 2.10 | 10.10 |
| Champion No. 1 (*a*) | 65.00 | 4.16 | .044 | .09 | 1.94 | .95 | .77 | .007 | ..... | .97 |
| Cleveland Bess. (*a*) | 66.08 | 2.75 | .040 | .11 | .20 | .25 | .24 | .017 | ..... | 1.42 |
| Cliffs Shaft (*a*) | 62.42 | 3.65 | .113 | .35 | 1.70 | 1.15 | 1.00 | .020 | 2.20 | 1.06 |
| Essex (*a*) | 60.00 | 10.25 | .110 | .30 | 2.20 | .53 | .20 | .020 | ..... | .75 |
| Foster (*a*) | 51.45 | 18.45 | .142 | .27 | 1.10 | .18 | .39 | .020 | 5.18 | 3.63 |
| Harvard Bess., H'm (*a*) | 65.00 | 2.88 | .050 | .43 | 1.64 | .23 | .15 | .018 | ..... | 11.93 |
| Ishpeming (*a*) | 59.00 | 6.75 | .070 | .480 | 2.18 | .220 | .400 | .010 | 4.17 | 12.85 |
| Jackson | 56.76 | 14.30 | .059 | .15 | 3.00 | ..... | ..... | .02 | ..... | 4.5 |
| Jack., H., No. 2 Bess | 50.01 | 24.23 | .047 | .15 | 2.93 | ..... | ..... | .02 | ..... | 2.9 |
| Lake | 59.87 | 5.80 | .100 | .540 | 2.61 | .440 | .630 | .015 | 4.21 | 12.82 |
| Lake Bessemer (*a*) | 64.00 | 4.96 | .038 | .230 | 1.05 | .210 | .170 | .029 | 1.79 | 10.37 |
| Lake Bess., E't End (*a*) | 61.34 | 7.48 | .047 | .33 | 2.09 | .23 | .30 | .014 | 2.94 | 12.00 |
| Lake Silica (*a*) | 48.16 | 25.17 | .039 | .43 | 1.69 | .36 | .47 | .035 | 1.65 | 11.00 |
| Lake Sup'r No. 1 (*a*) | 65.00 | 3.40 | .100 | .23 | 2.10 | .26 | .24 | .013 | ..... | 1.15 |
| Lillie | 61.56 | 6.10 | .078 | .39 | 1.97 | .34 | .11 | .008 | 3.12 | 9.90 |
| Mang'niferous H'm (*a*) | 55.29 | 6.30 | .075 | 3.75 | 2.00 | .82 | 2.57 | .025 | ..... | 10.00 |
| Marquette | 42.953 | 35.156 | .0576 | .2820 | .7913 | .1530 | .0940 | .2430 | 1.5660 | 6.17 |
| Missabe Friend (*a*) | 39.54 | ..... | .020 | ..... | ..... | ..... | ..... | ..... | ..... | .92 |
| Negaunee, N., Bess | 62.05 | 4.55 | .12 | .27 | 2.44 | .30 | .24 | .015 | ..... | 10.54 |
| Norfolk (*a*) | 56.00 | 13.43 | .045 | .11 | 3.18 | .71 | 1.05 | .030 | ..... | 1.03 |
| Oxford (*a*) | 64.50 | 4.40 | .076 | .32 | 1.80 | .25 | .23 | .013 | ..... | 1.15 |
| Old Mine H'm, Bess. (*a*) | 62.50 | 3.75 | .070 | .40 | 1.66 | .42 | .14 | .011 | ..... | 12.14 |
| O. M. H'm, H., Bess. (*a*) | 61.00 | 5.96 | .101 | .54 | 2.13 | .43 | .32 | .018 | ..... | 11.42 |
| Peninsula | 59.00 | 7.38 | .11 | .30 | 3.48 | .75 | .94 | .012 | ..... | 14.64 |
| Prince of Wales (*a*) | 61.55 | 6.10 | .12 | .36 | 1.72 | 1.40 | .46 | .012 | 2.20 | 13.00 |
| Queen | 62.00 | 5.81 | .13 | .24 | 2.16 | .44 | .32 | .012 | ..... | 13.48 |
| Republic, Special | 67.13 | 2.180 | .017 | Trace. | .651 | .100 | .140 | .014 | .500 | .60 |
| Republic, Specular | 67.34 | 2.50 | .035 | .03 | .97 | .48 | .10 | .010 | .42 | 1.19 |
| Republic, Kingston | 64.83 | 5.91 | .035 | .19 | .90 | .35 | .18 | .038 | .04 | 1.32 |
| Republic Magnetic (*a*) | 69.00 | 2.05 | .040 | .12 | .479 | .32 | .144 | .031 | ..... | 1.00 |
| Salisbury | 62.00 | 4.51 | .131 | .250 | 1.84 | .370 | .140 | .023 | 4.02 | 13.01 |
| Salisbury, Bessem'r (*a*) | 62.00 | 7.33 | .048 | .200 | 1.69 | .170 | .130 | .016 | 2.30 | 13.00 |
| Salisbury, Silica (*a*) | 49.31 | 24.10 | .054 | .36 | 2.20 | .35 | .18 | .016 | 2.30 | 11.10 |
| Savoy (*a*) | 60.00 | 9.25 | .090 | .34 | 1.85 | .27 | .17 | .025 | ..... | 2.00 |
| Sec. 16, No. 1 Bess. (*a*) | 65.00 | 4.39 | .016 | .36 | 1.68 | .19 | .15 | .015 | ..... | 4.08 |
| Sec. 16, No. 2 Bess. (*a*) | 62.25 | 8.43 | .034 | .25 | 1.72 | .19 | .12 | .015 | ..... | 3.25 |
| Sec. 21, Hematite (*a*) | 62.00 | 4.93 | .150 | .75 | 1.26 | .43 | .37 | .019 | ..... | 11.34 |
| Sheffield | 60.90 | 8.95 | .025 | .12 | 2.36 | .20 | .05 | .045 | 1.11 | 2.95 |
| S. Jackson, Silica | 42.56 | 33.71 | .040 | 1.98 | 1.58 | ..... | ..... | ..... | ..... | 9.79 |
| Swanzy (*a*) | 66.00 | ..... | .045 | ..... | ..... | ..... | ..... | ..... | ..... | 15.00 |
| Tilden, Silica | 41.40 | 38.75 | .028 | .100 | .56 | .180 | .070 | .018 | .47 | 8.29 |

*a* Expected analysis for 1898.

*Analyses of Lake Superior ores*—Continued.

MENOMINEE RANGE.

| Ore. | Iron. | Silica. | Phosphorous. | Manganese. | Alumina. | Lime. | Magnesia. | Sulphur. | Organic and volatile matter | Moisture. |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* |
| Aragon | 62.87 | 4.06 | .042 | .13 | .82 | .57 | 1.74 | .007 | ..... | 5.83 |
| Badger | 59.60 | 4.96 | .16 | .11 | 2.44 | .90 | 2.99 | .088 | ..... | 8.77 |
| Castile | 65.64 | 3.23 | .011 | .18 | 1.19 | .35 | .24 | .010 | ..... | 6.42 |
| Chapin (*a*) | 62.50 | 4.172 | .066 | .278 | .9747 | .4250 | 2.0542 | .0137 | 1.3175 | 6.87 |
| Clifford | 42.41 | 36.45 | .014 | .08 | 1.02 | .45 | .28 | .001 | ..... | 2.87 |
| Crystal Falls | 58.80 | 4.25 | .785 | .20 | 1.21 | 2.58 | .94 | .008 | 2.74 | 7.25 |
| Davidson | 56.10 | 6.70 | .20 | .30 | 3.28 | 1.75 | 2.80 | .10 | ..... | 8.35 |
| Dunn | 59.250 | 4.710 | .5440 | .3395 | 1.6305 | 1.7550 | .9455 | .0400 | 4.8850 | 9.03 |
| Elmwood | 57.35 | 6.35 | .16 | .75 | 3.25 | 1.25 | 3.28 | .073 | ..... | 8.75 |
| Florence | 57.600 | 4.340 | .3450 | .3590 | 3.1355 | 1.4300 | 1.8165 | .1635 | 5.4550 | 7.41 |
| Grenada | 62.92 | 3.98 | .064 | .15 | 1.36 | .49 | 1.41 | .015 | ..... | 7.19 |
| Hemlock | 59.74 | 4.49 | .235 | ..... | ..... | ..... | ..... | ..... | ..... | 4.95 |
| Homestead (*a*) | 54.87 | 4.68 | .086 | .38 | 2.05 | 3.48 | 4.87 | .003 | ..... | ..... |
| Keel Ridge (*a*) | 40.64 | 37.42 | .046 | .20 | .90 | 1.35 | 1.00 | .006 | ..... | 2.90 |
| Lerida | 63.60 | 3.82 | .17 | .19 | 1.15 | .72 | 1.44 | .003 | ..... | 6.64 |
| Loretto | 60.173 | 9.150 | .0156 | .1960 | 1.9840 | .2800 | .5910 | .1010 | 1.1830 | 9.40 |
| Mastodon (*a*) | 61.00 | 4.50 | .35 | .30 | 2.75 | .50 | .30 | .075 | ..... | 9.00 |
| Millie (*a*) | 63.95 | 2.573 | .026 | .1423 | .9230 | 1.0500 | 1.6830 | .0036 | 2.0330 | 5.78 |
| Pewabic | 64.78 | 4.41 | .009 | ..... | ..... | ..... | ..... | ..... | ..... | 7.57 |
| Pewabic Genoa | 45.10 | 30.25 | .008 | ..... | ..... | ..... | ..... | ..... | ..... | 5.14 |
| Rex | 56.96 | 5.865 | .063 | 1.1105 | 1.2137 | 1.3400 | 4.6635 | .0150 | 3.6150 | 6.17 |
| San Jose | 65.272 | 3.547 | .0127 | .1975 | 1.1172 | .1850 | .2905 | .0495 | .7350 | 8.38 |
| Sheridan (*a*) | 58.50 | 6.50 | .130 | .50 | 4.00 | .60 | .70 | .250 | ..... | 9.12 |
| Star Ludington | 63.370 | 4.655 | .0890 | .2542 | 1.0935 | .5100 | 1.1532 | .0052 | 1.1300 | 7.75 |
| Toledo | 56.18 | 15.01 | .009 | ..... | ..... | ..... | ..... | ..... | ..... | 6.08 |
| Tyrone (*a*) | 62.00 | 3.91 | .106 | .19 | .72 | 1.50 | 1.90 | .003 | ..... | ..... |
| MESABI RANGE. | | | | | | | | | | |
| Adams | 63.87 | 3.14 | .035 | .44 | .95 | .25 | .12 | .005 | 3.40 | 8.49 |
| Ainalie (*a*) | 62.51 | 4.00 | .074 | .40 | 2.80 | .30 | .23 | .001 | ..... | 9.80 |
| Allegheny | 61.649 | ..... | .0684 | .867 | ..... | ..... | ..... | ..... | ..... | 11.071 |
| Auburn | 64.65 | 2.63 | .043 | .32 | 1.60 | .30 | .28 | Trace. | 2.30 | 10.12 |
| Audrey | 62.74 | 3.05 | .060 | .54 | 1.70 | .40 | .23 | Trace. | 4.30 | 12.94 |
| Berringer (*a*) | 61.16 | 4.55 | .065 | .35 | 1.59 | .11 | .07 | .012 | ..... | 8.91 |
| Biwabik | 63.52 | 3.75 | .033 | .50 | 1.00 | .27 | .12 | .004 | 3.35 | 8.20 |
| Canton (*a*) | 60.80 | 4.25 | .048 | .49 | .93 | .71 | .07 | Trace. | ..... | 9.97 |
| Cincinnati (*a*) | 61.02 | 8.00 | .0308 | .75 | .98 | .34 | .15 | .015 | ..... | 9.00 |
| Climax (*a*) | 63.64 | 1.94 | .036 | .87 | .60 | .88 | Trace. | Trace. | ..... | 8.65 |
| Cloquet | 61.47 | 4.30 | .046 | .54 | 1.45 | .35 | .10 | .019 | 5.55 | 17.37 |
| Commodore | 64.10 | 3.90 | .039 | .18 | 1.10 | .24 | .06 | .004 | 3.40 | 9.30 |
| Duluth (*a*) | 63.00 | 4.00 | .050 | .30 | 1.40 | .12 | .10 | .012 | ..... | 8.50 |
| Fayal | 62.81 | 3.87 | .033 | .87 | 1.10 | .31 | .10 | Trace. | 3.70 | 9.52 |
| Franklin | 63.150 | 3.775 | .0345 | .5010 | .9355 | .1400 | .2090 | .0115 | 3.8250 | 7.53 |
| Genoa | 63.54 | 3.75 | .031 | .45 | 1.30 | .22 | .14 | Trace. | 3.30 | 10.41 |
| Hale (*a*) | 60.00 | 5.00 | .100 | .55 | .52 | 1.58 | ..... | .016 | ..... | 9.00 |
| Hartley (*a*) | 64.80 | 3.12 | .040 | .40 | 1.47 | .40 | .19 | .003 | ..... | 8.05 |

*a* Expected analysis for 1898.

*Analyses of Lake Superior ores*—Continued.

MESABI RANGE—Continued.

| Ore. | Iron. | Silver. | Phosphorus. | Manganese. | Alumina. | Lime. | Magnesia. | Sulphur. | Organic and volatile matter. | Moisture. |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* |
| Hibbing | 65.38 | 2.40 | .030 | .39 | .79 | .12 | .07 | .014 | ..... | 11.10 |
| Juniata | 59.565 | ..... | .0817 | 1.210 | ..... | ..... | ..... | ..... | ..... | 10.667 |
| Linwood (*a*) | 63.59 | 4.25 | .054 | .45 | 1.55 | .60 | .25 | .010 | ..... | 8.95 |
| Mangan (*a*) | 59.80 | 5.50 | .034 | .68 | 1.52 | .32 | .10 | ..... | ..... | 13.55 |
| Minnewas (*a*) | 65.50 | 2.23 | .046 | .48 | 1.12 | .20 | .18 | .010 | ..... | 9.00 |
| Mountain | 64.197 | ..... | .0447 | .281 | ..... | ..... | ..... | ..... | ..... | 12.260 |
| Norman | 61.98 | 3.84 | .067 | .72 | 2.20 | .44 | .16 | .004 | 3.64 | 10.40 |
| Oliver | 63.844 | ..... | .0552 | .388 | ..... | ..... | ..... | ..... | ..... | 11.879 |
| Pillsbury (*a*) | 63.00 | 5.40 | .030 | .40 | .90 | .15 | .10 | .012 | ..... | 9.00 |
| Preble | 59.596 | ..... | .0822 | 2.688 | ..... | ..... | ..... | ..... | ..... | 9.637 |
| Penobscot | 63.518 | 4.075 | .0324 | .4750 | 1.210 | .1950 | .1000 | .0115 | 2.6150 | 12.27 |
| Roberts (*a*) | 60.00 | 11.02 | .0219 | .66 | .93 | .09 | .115 | .009 | 1.82 | 8.705 |
| Saxon (*a*) | 64.29 | 3.75 | .039 | .56 | 1.21 | .12 | .04 | ..... | ..... | 8.00 |
| Sparta | 65.45 | 2.98 | .029 | .20 | .88 | .30 | .25 | Trace. | 2.25 | 7.00 |
| Sparta Top Brown | 60.52 | 6.10 | .056 | .12 | 1.35 | .51 | .33 | .007 | 5.00 | 9.75 |
| Tubal (*a*) | 63.25 | 4.50 | .065 | .45 | 1.75 | .20 | .08 | .013 | ..... | 11.54 |
| Valley (*a*) | 61.03 | 5.66 | .041 | .81 | ..... | ..... | ..... | ..... | ..... | 12.76 |
| Vega (*a*) | 61.99 | 5.40 | .040 | .26 | 1.45 | .33 | .18 | ..... | ..... | 11.57 |
| VERMILION RANGE. | | | | | | | | | | |
| Chandler | 65.23 | 3.51 | .036 | .25 | 1.80 | .28 | .12 | Trace. | .85 | 5.47 |
| Long Lake (*a*) | 60.59 | 7.80 | .040 | .13 | 1.85 | .72 | .20 | .004 | ..... | 7.55 |
| Minnesota | 67.98 | 1.60 | .046 | .08 | 1.35 | .47 | .11 | Trace. | .35 | 1.02 |
| Pilot (*a*) | 61.20 | 9.96 | .030 | .66 | 1.62 | .21 | .10 | .006 | ..... | 8.00 |
| Pioneer (*a*) | 64.80 | 4.19 | .036 | .28 | 1 91 | .11 | .05 | .001 | ..... | 7.47 |
| Red Lake | 64.70 | 4.00 | .129 | .09 | 2.05 | .70 | .30 | .007 | .75 | 2.74 |
| Soudan | 65.94 | 3.79 | .100 | .09 | .96 | .80 | .55 | .002 | .50 | 1.44 |
| Vermilion | 67.08 | 2.05 | .142 | .11 | .98 | 1.22 | .24 | .004 | .41 | 1.11 |
| Zenith | 65.03 | 3.820 | .0510 | .1600 | 1.8800 | .4700 | .1500 | None. | .6500 | 5.04 |

*a* Expected analysis for 1898.

*Analyses of Lake Superior iron ores.*

[Furnished by Messrs. Norton, Oglebay & Co.]

| | Iron. | Silica. | Phosphorus. | Manganese. | Sulphur. | Alumina. | Lime. | Magnesia. | Water. |
|---|---|---|---|---|---|---|---|---|---|
| | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* |
| **GOGEBIC RANGE.** | | | | | | | | | |
| Fairfax | 63.21 | 3.95 | .059 | 1.00 | .015 | 1.22 | .45 | .25 | 13.08 |
| Globe (a) | 63.85 | 1.90 | .088 | .15 | .004 | 1.10 | .10 | .06 | 9.50 |
| Pence (a) | 65.20 | 5.50 | .019 | .24 | .014 | .28 | .15 | .05 | ..... |
| Windsor (a) | 64.00 | 4.00 | .045 | .65 | .008 | .80 | .31 | .10 | ..... |
| **MENOMINEE RANGE.** | | | | | | | | | |
| Appleton (a) | 63.30 | 4.61 | .018 | .27 | .019 | 1.30 | .52 | .47 | 8.50 |
| Claire (a) | 54.46 | 3.65 | 1.21 | 1.26 | .015 | 1.13 | 3.20 | 1.22 | 6.50 |
| Commonwealth | 60.00 | 4.75 | .22 | .75 | .15 | 1.65 | 1.40 | 1.20 | 6.25 |
| Great Western (a) | 61.03 | 3.98 | .249 | .92 | .052 | 2.31 | .92 | 1.65 | 6.50 |
| Iron River | 59.80 | 5.29 | .356 | .37 | .028 | 3.41 | .69 | .37 | 9.50 |
| Lincoln (a) | 60.86 | 3.86 | .24 | .45 | .010 | 1.67 | .46 | .23 | 11.00 |
| Ludington (a) | 65.60 | ..... | .024 | ..... | ..... | ..... | ..... | ..... | 7.06 |
| Mansfield (a) | 63.36 | 4.14 | .044 | .38 | .019 | 1.97 | .46 | .23 | 11.00 |
| Paint River (a) | 56.40 | 3.48 | .502 | .378 | .068 | 6.12 | 5.58 | .718 | 8.00 |
| **MARQUETTE RANGE.** | | | | | | | | | |
| Angeline, South (a) | 62.87 | 4.45 | .128 | .27 | .023 | 1.79 | .33 | .06 | 11.02 |
| Beacon (a) | 46.00 | 29.75 | .043 | .07 | .030 | 2.50 | 1.00 | .80 | .84 |
| Columbia (a) | 59.13 | 8.20 | .055 | .06 | ..... | 1.46 | 1.35 | .06 | 10.77 |
| Eastend, Bessemer (a) | 61.06 | 7.48 | .046 | .33 | .014 | 2.09 | .23 | .30 | 10.33 |
| Foster, silica (a) | 42.00 | 27.00 | .122 | 3.86 | .002 | 1.36 | .20 | 3.67 | 3.00 |
| Humboldt (a) | 65.90 | 3.91 | .15 | .13 | .020 | 1.88 | .88 | .24 | ..... |
| Lake, Bess, No. 1 (a) | 65.44 | ..... | .030 | ..... | ..... | ..... | ..... | ..... | 9.97 |
| Michigamme (a) | 66.50 | 4.67 | .013 | .23 | .050 | .07 | .25 | .62 | .75 |
| Negaunee (a) | 63.53 | 4.55 | .057 | .25 | .025 | 2.64 | .75 | .15 | 10.67 |
| Platt (a) | 58.70 | ..... | .038 | ..... | ..... | ..... | ..... | ..... | 8.78 |
| Regent | 61.47 | 7.71 | .064 | .22 | ..... | 2.33 | .76 | .17 | 13.47 |
| Sawmill (a) | 60.00 | ..... | .060 | ..... | ..... | ..... | ..... | ..... | .84 |
| Sec. 16, New Shaft (a) | 64.50 | 5.43 | .035 | .27 | .016 | 1.49 | .27 | .18 | 2.08 |
| Volunteer (a) | 57.79 | 12.46 | .069 | .20 | .019 | 2.23 | .29 | 1.73 | 1.50 |
| Winthrop (a) | 61.25 | 6.88 | .135 | .71 | .027 | 1.34 | .44 | .38 | 11.37 |
| **MESABI RANGE.** | | | | | | | | | |
| Beaver | 63.95 | 2.20 | .079 | .17 | .012 | 1.50 | .20 | .10 | 10.61 |
| Cincinnati, silica (a) | 59.00 | 8.00 | .030 | .60 | .015 | 1.00 | .34 | .15 | 8.00 |
| Etna (a) | 64.00 | 3.50 | .045 | .50 | .010 | 1.85 | .35 | .15 | 11.00 |
| Helmer (a) | 64.00 | 3.65 | .051 | .48 | .015 | 1.80 | .15 | .10 | 11.15 |
| McKinley (a) | 62.30 | 8.36 | .026 | .37 | .016 | .93 | .48 | .23 | 8.75 |
| Sellers (a) | 64.23 | 3.66 | .036 | .38 | .019 | .95 | .19 | .12 | 8.73 |
| Shenango (a) | 64.07 | 2.69 | .060 | .30 | .020 | 1.62 | .20 | .16 | 10.53 |
| South Side (a) | 61.05 | 4.22 | .070 | ..... | .013 | 3.40 | .25 | .10 | 9.68 |
| Williams (a) | 60.40 | 9.20 | .036 | .77 | .011 | .95 | .42 | .12 | 9.70 |

a Expected analysis for 1898.

## IMPORTS.

The following figures, supplied as in former years through the courtesy of the Chief of the Bureau of Statistics, Treasury Department, show the imports of foreign iron ore into the United States during the year ending December 31, 1897, by countries, and the entries by customs districts, together with the values of the ore. To these have been added, for the purpose of comparison, similar data for the year 1896:

*Quantity and value of iron ores imported into the United States in 1896 and 1897.*

| From— | 1896. | | 1897. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Long tons.* | | *Long tons.* | |
| Cuba | 380,551 | $463,570 | 383,820 | $454,709 |
| Spain | 121,132 | 230,879 | 66,193 | 167,878 |
| French Africa | 79,661 | 163,517 | 3,504 | 7,785 |
| Italy | 29,882 | 85,661 | ..... | ..... |
| Greece | 33,750 | 34,520 | ..... | ..... |
| Newfoundland and Labrador | 20,800 | 20,965 | 29,250 | 29,431 |
| United Kingdom | 8,528 | 23,155 | 358 | 4,091 |
| Colombia | 3,150 | 5,800 | ..... | ..... |
| Portugal | 1,101 | 2,327 | 3,612 | 5,831 |
| Other countries | 4,251 | 6,523 | 3,233 | 9,187 |
| Total | 682,806 | 1,036,917 | 489,970 | 678,912 |

The total amount imported, 489,970 long tons, was valued at $678,912, or $1.39 per ton. This is a decrease of 192,836 long tons, or 28.24 per cent, over the total of 1896, viz, 682,806 tons, which was valued at $1.52 per ton.

The imports of iron ore in 1897, by customs districts, were as follows, that of 1896 being also given for comparison:

*Imports of iron ore into the United States in 1896 and 1897, by customs districts.*

| Ports. | 1896. | | 1897. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Long tons.* | | *Long tons.* | |
| Baltimore, Md | 368,761 | $577,135 | 292,613 | $369,433 |
| Philadelphia, Pa | 308,217 | 444,687 | 194,814 | 302,211 |
| New York, N Y | 4,199 | 10,499 | 309 | 1,272 |
| Boston, Mass | 78 | 216 | 46 | 112 |
| Total Atlantic ports | 681,255 | 1,032,537 | 487,782 | 673,078 |

*Imports of iron ore into the United States in 1896 and 1897, etc.*—Continued.

| Ports. | 1896. | | 1897. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Long tons.* | | *Long tons.* | |
| Cuyahoga, Ohio | 1,033 | $1,911 | ..... | ..... |
| Champlain | ..... | ..... | 104 | $156 |
| Detroit, Mich. | Not given. | 10 | 139 | 186 |
| Vermont | ..... | ..... | 21 | 81 |
| Total Lake ports | 1,033 | 1,921 | 264 | 423 |
| Paso del Norte, Tex. (total Gulf ports) | 257 | 159 | 919 | 2,525 |
| Puget Sound, Wash. (total Pacific ports) | 126 | 350 | 1,000 | 2,826 |
| Pittsburg, Pa. (interior port) | 135 | 1,950 | 5 | 60 |
| Total imports | 682,806 | 1,036,917 | 489,970 | 678,912 |

The war between the United States and Spain has affected, and if continued would affect more seriously, the foreign iron-ore trade. Since 1884 Cuba has been a source of supply for some of the blast furnaces of the United States, and lately has also forwarded this mineral to European ports. The shipments of iron ore, which in 1897 amounted to 451,629 long tons, were from the port of Santiago de Cuba on the southern coast, and from a dock located at Daiquiri, some 20 miles east of Santiago Bay. This dock was of material aid to the United States in landing troops and supplies, and the two railroads were used as avenues of approach in the assault made upon the Spanish intrenchments.

Work at the Cuban iron-ore mines was necessarily abandoned before hostilities began, but will undoubtedly be resumed promptly when the present contest is settled and security given to the labor and shipping engaged. Since 1884, when mining was commenced, three and a half million tons of iron ore have been shipped from the province of Santiago de Cuba. The mines have been developed by capital supplied by the United States, and the management is directed from this country.

Spain has been a large exporter of iron ores from the Bilbao and other districts, and these ores have become of great importance to British and continental furnace managers. Great Britain uses about 5,000,000 long tons of Spanish iron ore annually, which constitute its main reliance to supplement the domestic mineral. In Spain the army and navy demands have depleted the supply of laborers, and the war taxes may seriously affect the iron-ore production. As much of the ore is sent to England from Spain in vessels whose return cargo is coal, any interference with the shipments of iron ore would immediately

affect the coal trade. Hence iron ore threatened to become an important factor in the controversy.

During the year 1897 Spain produced 7,468,000 metric tons of iron ore, an increase of 700,000 tons over 1896. Of the total output, 5,170,000 came from the provinces adjoining the Bay of Biscay. Most of the Spanish iron ore was exported, some 5,000,000 tons going to Great Britain, 1,000,000 tons to Germany, 500,000 tons to France, 200,000 tons to Belgium, and 66,193 tons to the United States. The home consumption in 1897 did not exceed half a million tons.

## SHIPMENTS OF CUBAN IRON ORES.

The Juragua Iron Company, Limited, was the earliest producer of iron ore in the Santiago district of Cuba, its first cargo being exported August 7, 1884. The Sigua Iron Company did not ship any ore until October, 1892, and the Spanish-American Iron Company made its first shipment May 27, 1895.

The production of each of these companies has been as follows:

*Production of three iron-ore companies in Cuba.*

| Year. | Juragua Iron Company. | Sigua Iron Company. | Spanish-American Iron Company. | Total. |
|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| 1884 | 21,798 | ..... | ..... | 21,798 |
| 1885 | 81,106 | ..... | ..... | 81,106 |
| 1886 | 111,710 | ..... | ..... | 111,710 |
| 1887 | 97,711 | ..... | ..... | 97,711 |
| 1888 | 198,040 | ..... | ..... | 198,040 |
| 1889 | 256,278 | ..... | ..... | 256,278 |
| 1890 | 362,068 | ..... | ..... | 362,068 |
| 1891 | 266,377 | ..... | ..... | 266,377 |
| 1892 | 322,527 | 7,830 | ..... | 330,357 |
| 1893 | 348,863 | 14,022 | ..... | 362,885 |
| 1894 | 150,440 | ..... | ..... | 150,440 |
| 1895 | 311,053 | ..... | 74,991 | 386,044 |
| 1896 | 298,299 | ..... | 114,101 | 412,400 |
| 1897 | 244,817 | ..... | 206,812 | 451,629 |
| Total | 3,071,087 | 21,852 | 395,904 | 3,488,843 |

In addition to the amounts given above for the Juragua Iron Company, Limited, which represents the actual imports, four cargoes, comprising 10,131 long tons, were lost at sea.

## THE MARQUETTE RANGE OF MICHIGAN.

The unprecedented record of Minnesota and the phenomenal development of the iron-ore industry in that State, made possible by the ease with which ore is extracted from deposits of enormous extent, raise the question as to the influence thus exerted on mining in other Lake Superior ranges and as to the probable future influence. That the new developments have affected the mines on the other ranges is unquestionable, but an examination of the records shows that the outputs of the latter have been curtailed to a less extent by the product of the newest claimant, the Mesabi Range of Minnesota, than was expected. The production of the various ranges in the past five years has been as follows:

*Production of Lake Superior iron ore, by ranges.*

| Range. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Marquette..... | 2,064,827 | 1,935,379 | 1,982,080 | 2,418,846 | 2,673,785 |
| Menominee..... | 1,563,049 | 1,255,255 | 1,794,970 | 1,763,235 | 1,767,220 |
| Gogebic..... | 1,466,815 | 1,523,451 | 2,625,475 | 2,100,398 | 2,163,088 |
| Vermilion ..... | 815,735 | 1,055,229 | 1,027,103 | 1,200,907 | 1,381,278 |
| Mesabi..... | 684,194 | 1,913,234 | 2,839,350 | 3,082,973 | 4,220,151 |
| Total ..... | 6,594,620 | 7,682,548 | 10,268,978 | 10,566,359 | 12,205,522 |

This table is not carried further back than 1893 because, although the Mesabi Range made its first shipments in 1892, the amount sent forward, 29,245 tons, was insufficient to exert any decided influence upon the other ranges and because the output of these ranges in the years 1890 to 1892 were above what might be considered as the normal product, the three years named showing unusually large consumption of domestic ores.

The Marquette Range as the oldest was expected to feel most keenly the competition of the various new ranges as they became producers, and especially that exerted by the Mesabi Range. The statement in the table, however, does not bear out this expectation, for although the Marquette Range would undoubtedly have been called upon to supply some of the ore which has been furnished by the Mesabi Range it appears to have maintained its normal output, and, in fact, to have surpassed this in the years 1896 and 1897. The contribution from the Mesabi Range may therefore be considered as supplying practically new demands; but the reduced expense of winning ore on this range has influenced the price which ores from the other ranges command.

A late visit was made to the Lake Superior region in order to study the effect of the new developments upon the other ranges, but circum-

stances prevented this personal inquiry from being extended beyond the Marquette Range.

The continued exploitation of the larger mines by extending operations laterally and vertically, the sinking of new shafts, the introduction of improved equipments, the additional transportation facilities provided, and the development of new finds demonstrated the faith held by the managers in the permanency of the producing deposits of the Marquette Range. This activity was not confined to the mines furnishing the high-grade ores, but was noticeable at some which produced ores below what has been considered the shipping limits of iron contents. The fact that these lean ores were sold for mixtures, as low phosphoro-siliceous ores, does not detract from their exploitation as an indication of progress, but rather illustrates the economies which have been introduced in mining and transporting ores.

There are fewer producing mines than formerly in the Marquette Range and a number of consolidations have taken place. Some mines which had been under lease have been returned to the lessors, operations at some have been suspended, some have been abandoned, and some have been exhausted. But the general activity throughout the range indicated no prevailing decadence, and a study of the apparent ore reserves encourages faith in the continuation of iron-ore mining on a liberal scale in the Marquette Range.

Should the effort to utilize the leaner ores locally meet with success, the output from the range will be augmented in the future.

In the report for 1895 a list of mines and exploitations in the Marquette Range was published. This list, prepared by Mr. James E. Jopling, M. E., included 19 active mines, 12 mines considered as temporarily suspended, and 44 abandoned enterprises. A late revision of this list shows 17 active mines, 11 suspended mines, and 41 abandoned enterprises. The 17 mines in the active list have contributed a total to date of 38,024,852 tons of iron ore; 2 of these made their first shipments subsequent to the opening of the Mesabi Range. Eight mines which have suspended since 1892 are credited with a total of 3,833,284 tons. The 41 abandoned mines have produced an aggregate of 4,555,209 tons of ore; of these, 8 abandoned subsequent to 1892 have furnished a total of 1,893,193 tons, of which amount the New York mine contributed 1,113,102 tons up to 1894, when the deposit was considered as exhausted.

Mr. Jopling discussed the Marquette Iron Range in a paper[1] as follows:

> The geographical position of this range, nearer to eastern ports than the other iron ranges, and its ready access from Lake Superior gave it for a long time a controlling advantage. The country in which the mines are situated is from 800 to 1,000 feet above the level of the lake, and is for the most part broken by steep hills, which rise from 100 to 200 feet; between these the land is rolling or swampy. The eastern part is on the watershed between Lakes Superior and Michigan, affording good drainage.

[1] Trans. Am. Inst. Min. Eng., Vol. xxvii, p. 541.

Geologically, the range is in the Algonkian area, which is generally less than ten miles wide, and is bounded north and south by the Archæan, consisting of syenite, gneiss, granite, etc. The Lower and Upper Marquette formations, into which the Algonkian has been divided by Dr. Van Hise, of the United States Geological Survey, correspond to the Huronian formation of Canada. It is in a subdivision, termed by the same geologist the Negaunee formation, that most of the ore-bodies occur, generally associated with the greenstones which in many places underlie them, and in others cut across the formation in the form of dikes. Generally speaking, the soft hematite ores occupy a lower geological horizon than the hard ores, which, in some places, are found to rest unconformably upon them.

The ore-bodies are extremely irregular in shape and size, and appear to be segregations in the mass of jasper, with which they are always associated. As a general rule, the soft ores occur beneath the jasper, and either in complete or partial basin-shaped deposits, in synclinal folds of the greenstone or schist, with a pitch to the west. The hard ores, on the other hand, usually occur above the jasper and next to the overlying quartzite, etc., of the Upper Marquette formation. The depth to which these formations extend is still unknown, although in the oldest mines which contain the hard ores from 1,200 to 1,300 feet has been reached. The ore at greater depth is not so extensive as near the surface. Soft ore has not been followed to such a depth on this range; the deepest mine of this description reached nearly 1,000 feet from the surface before the various shoots or chimneys from the main mass pinched out.

When Michigan became a State in 1837 and Dr. Houghton was appointed State geologist, the systematic exploration of the Upper Peninsula was begun. On the failure of the State to raise enough money to carry on the work in detail, he persuaded the authorities at Washington to combine a geological survey with that of the township and subdivision lines; and it was a result of this work that iron ore was first discovered in 1844.

The first attempts at mining in this district were to supply ore for the Catalan forges erected near the mines and also in Marquette.

In 1850 5 tons of ore were sent to Newcastle, Pennsylvania. In 1852 70 tons of Jackson ore were sent to Sharon, Pennsylvania.

The locks at Sault Sainte Marie were completed in June, 1855, and at the same time a plank road was constructed from Marquette to the mines, and regular shipments were begun. In the following year the construction of a railway was begun, and it was completed in 1857.

There had been no returns to any of the capital invested in the district previous to 1862, when the Jackson Company declared its first dividend. From this time the yearly shipments increased from 124,169 tons to 1,162,458 tons in 1873, after which they gained slowly until 1890, when they reached the highest point, namely, 2,993,664 tons.

During the comparatively high prices that obtained until 1890 an enormous amount of exploring was done on the range, but since the opening of the Republic Mine in 1872 there have been few profitable undertakings in new territory. Among these few are the Queen Group and the Negaunee.

It was not until 1870 that the soft hematite ores of the district were considered as of any value, all the previous work having been done in the hard ores. But in the next few years a large number of pits were opened at the east end of the range in this grade of ore.

Beginning in 1880, a number of pits in limonite ore were opened near Champion and also near Michigamme. This ore, which was apparently quite shallow and in no case very clean or regular, could be mined with profit only while prices were higher than usual. The last and the most extensive mine in this kind of ore, the Imperial, was shut down in 1892.

For many years—in fact, as late as 1880—most of the ores at Ishpeming and Negaunee were worked in open pits.

Where the ore had to be raised, use was made of derricks and horse whims, or else of carts on inclined roads. Tram cars were first used about 1880; before this time wheelbarrows and trucks were employed. Powder drills driven by steam or compressed air were not introduced until 1878. The development of these irregular bodies of ore was aided to a marked extent by the introduction of diamond drills, by the use of which a core could be taken, proving the ground in some places to the depth of 1,000 feet. With them it was possible to locate an ore deposit situated under a swamp, or by drilling through the ice of a lake to determine the presence of enough merchantable ore under the bed of it to warrant a large expenditure of money, as was the case with Lake Angeline. The system of stoping hard ores, and leaving pillars enough to support the hanging wall, was the one generally adopted. Many of the mines opened under this plan have been since filled, and the pillars have been removed. No water power has been used for generating electricity for the mines. At Republic the air compressors are driven by the falls of the Michigamme River.

The Marquette Range has shipped 46,542,662 tons of iron ore, or nearly half of the entire Lake Superior product to date. By the adoption of a policy of strict economy in methods of mining, the cost of winning ore has been materially reduced, especially at the mines which had previously been opened up far ahead of their present needs and had been equipped with modern machinery.

Ishpeming and Negaunee remain the center of mining on the range; in fact, except Republic and Champion, nearly all the ore shipped is from their city limits.

The development of the ores of the range has been greatly assisted by the well-known geologists who have been connected with the United States and State survey. Dr. Houghton, who has been mentioned, was followed by Foster and Whitney, who published in 1850 the results of the explorations. The work has been ably carried forward in different lines by Brooks and Pumpelly, Charles E. Wright, Dr. Wadsworth, Dr. Hubbard, and Dr. Van Hise, who have all published valuable reports on the Marquette Range at different stages of its development.

The United States Geological Survey has published a monograph, Vol. XXVIII, accompanied by an atlas, on the Marquette iron-bearing district of Michigan.

The competition with the other iron-ore ranges of the Lake Superior region has demanded that the managers of mines of the Marquette Range employ improved methods of mining to remove the mineral at least expense. Some of the cost sheets show that remarkable results have been obtained under great difficulties. While the ores of the Mesabi Range as a rule command prices below those of ores of similar chemical composition obtained from the other ranges, this difference is not sufficient to permit wasteful methods, and the cost of mining ore from deep underground workings in each of the ranges is remarkably low. Good management is not confined to any of the ranges, for in each there are notable evidences of skill in overcoming difficulties and energy in pushing the work of development.

One of the interesting mining problems of the Marquette Range is the winning of ore from a lense which extended under Lake Angeline, a considerable body of water, which has been drained and the stream supplying it diverted. A large accumulation of mud in the bottom of what was the lake gives trouble by reason of the ore lense approaching the old lake bottom, but from the area formerly covered by water large amounts of ore have been and are being taken.

There seems to be no reason to anticipate an early exhaustion of the known deposits of the Marquette Range, whose extent has been proved by exploratory work, and which, in some cases, have been opened up considerably in advance of immediate requirements. On the contrary, it may be expected to continue as a source of supply for a large quantity of ore of superior quality, and the extent of the deposits of some of its lean ores may, with cheap transportation, encourage increased outputs from these. A strong effort is also being made to rehabilitate the iron-producing industry in the Marquette Range with the purpose of utilizing some of the local ores, especially those which carry insufficient iron to withstand the freight charges to existing furnaces.

With two railroads connecting most of the large producing mines with docks on Lake Superior by a haul of but 15 to 20 miles, and in addition rail connection by competing routes to docks on Lake Michigan, the Marquette Range has good shipping facilities. The distance by vessel travel to the lower lake receiving docks from these ore docks is also less than from the Gogebic, Vermilion, or Mesabi ranges of Lake Superior.

## THE IRON ORES OF ALABAMA.

The rapid development of iron production in Alabama has naturally drawn liberal attention to the iron ores of this State and of its neighbors, Tennessee and Georgia.

Much has been written upon these deposits, and they were referred to in the Annual Report of the United States Geological Survey for 1894.

The following, condensed principally from a late contribution by Mr. Henry McCalley, of the Alabama geological survey, is presented in view of the prospective introduction of basic steel production in Alabama.

While Georgia and Tennessee mine considerable red and brown hematite ores, it is in Alabama that the Clinton fossil formation, from which the bulk of the iron ore is obtained, finds its greatest development, particularly in the vicinity of Birmingham, where a great fold occurs.

The hematites of Alabama are in regular stratified seams, somewhat local in their occurrence and importance. They occur in the Upper Silurian, Lower Silurian, and Cambrian formations, although only those in the first-named formation are in sufficient quantity in Alabama to be of any great commercial value.

The Upper Silurian ores in Alabama, known as red ores, dyestone ores, Clinton ores, fossiliferous ores, lenticular ores, oolitic ores, etc., are from the Red Mountain, Dyestone, or Clinton beds, and are variable in thickness and composition. The thickness ranges up to 700 feet, the beds feather out and become coarser or more sandy toward the southeast, and also in a more gradual way toward the southwest.

The principal ore-bearing strata are in the central part of the formation, and good workable ores are found only in places.

The red ore seams are very persistent in the direction of the strike, or from northeast to southwest, notwithstanding the fact that they are variable in both thickness and quality in this direction. The outcrops in Alabama are considerably over 500 miles in length, but they are too thin and lean to be worked over more than a small fraction of this distance. The good workable ores are in from 1 to 5 different seams, that range in thickness from a few inches to over 30 feet.

These seams near the Tennessee line or in the Tennessee Valley are from 1 to 10 feet thick, but they are too lean to be of any value other than as fluxing rocks, being nothing more than slightly ferruginous siliceous limestones. Next to the Georgia line they are from 1 to 4 feet thick, and are of good quality. To the southwest, in Alabama, they are in many places on the outcrops nothing more than leached ferruginous sandstones. The workable Clinton ores of Alabama may therefore be said to be confined to the anticlinals and synclinals just to the northwest of the badly folded and faulted strata of the Appalachian region. Their impurities are almost wholly of siliceous matter and carbonate of lime, except near the southwest end, where they are cut up by partings or interstratified seams of light and reddish unctuous clays.

The dips on the outcrops vary from a vertical to about 10 degrees to the southeast or northwest side of the valley.

The faults, when on the northwest sides of the valleys, are called overthrust faults, because the older strata of the central parts of the valleys to the southeast are thrust over on top of the younger strata to the northwest; and those on the southeast sides of the valleys are called underthrust faults, because the younger strata to the southeast are thrust under the older strata of the central part of the valleys to the northwest.

Though the red ore seams or the Red Mountain strata of Alabama are not the same in two places on the strike but a short distance removed from each other, still the strata of East Red Mountain, between Birmingham and Bessemer, where the Clinton ores are the most highly developed, are approximately represented by the following general section:

*Approximate general section of East Red Mountain between Birmingham and Bessemer.*

| Fort Payne chert (Lower Carboniferous). | Thickness in feet. |
|---|---|
| Black shale (Devonian) | 0 to 1 |
| 18. Iron sandstone, very hard, calcareous | 6 to 8 |
| 17. Siliceous limestone, sandstone, and shales | 15 to 20 |
| 16. Ferruginous siliceous limestones; very limy ore, beyond point of weathering | 30 to 35 |
| 15. Sandstone | 20 to 30 |
| 14. Ferruginous sandstone; very sandy ore | 40 to 45 |
| 13. Sandstone | 20 to 25 |
| 12. Ore, sandy | 2 to 5 |

| | Thickness in feet. |
|---|---|
| 11. Sandstone, sandy ore, a sandstone with from 3 to 20 feet of its central part a sand ore | 40 to 60 |
| 10. Ore, shales; principally siliceous ore with interstratified shale, with the hickory nut or gray ore seam from 2 to 5 feet thick near its top, and the Ida seam from 2 to 3 feet thick near its bottom | 15 to 35 |
| 9. Sandstone, shales | 0 to 25 |
| 8. Upper bench of the Big or Red Mountain ore seam | 10 to 22 |
| 7. Parting | 0 to 5 |
| 6. Lower bench of the Big or Red Mountain ore seam | 3 to 14 |
| 5. Shales, sandstones | 0 to 36 |
| 4. Ore, Irondale seam | 3 to 6 |
| 3. Sandstone, shales | 25 to 40 |
| 2. Ore, silliceous | 3 to 10 |
| 1. Sandstone, shales | 75 to 125 |

Pelham or Trenton limestones (Lower Silurian).

Three of these ore seams—the Ida seam, the whole or both the upper bench and lower bench of the Big or Red Mountain seam, and the Irondale seam—have all been worked between Birmingham and Bessemer; although the upper 10 to 14 feet, or the upper bench of the Big or Red Mountain seam, has furnished the preponderance of the ore for the Birmingham district. This Big or Red Mountain seam is en masse near Birmingham, but it gradually splits into two parts or benches toward the southwest, until these benches near Bessemer are 5 feet apart. This seam has been stripped, and its upper bench has been worked on the outcrop almost the entire distance of 11 miles between Birmingham and Bessemer. The strippings either cover the crest or occur just to the northwest of the crest of the mountain, as the mountain is comparatively high or low. They extend down on the ore from a few feet to about 150 feet, or until the cover becomes from 15 to 20 feet thick, or too thick to be removed. The dip of the ore on the outcrop between Birmingham and Bessemer is from 25° to 35° to the southeast. It usually keeps this dip for 500 to 600 feet down on the dip, when it begins to flatten. The ore in the big seam is best at the top, becoming gradually more and more siliceous from top to the bottom of the seam. About one-half of the mines between Birmingham and Bessemer—all of those on the southeast side of the mountain—are worked by gravity, the loaded and balance cars in their descent pulling up the empty cars, while the other half of the mines on the steep northwest side of the mountain use steam for hoisting purposes.

The red ore on the outcrop or the leached ore, containing little or no lime, is called soft ore, and the unleached or limy ore is known as hard ore, without any respect to the actual softness or hardness. The soft ore is usually hard enough to blast out in blocks, and extends from 150 to 200 feet on the dip from the outcrop, although in some places it goes down as far as 300 feet, and in others only a few feet, the hard ore setting in at the outcrop. The distance to which the soft ore extends down on the dip is dependent on the cover. The passage from one ore to the other is sudden, or the line between the two ores is distinct

ity, comparatively low in silica and phosphorus, is sometimes rough and cherty, and often high in phosphorus. This rough or cherty ore is usually in large bowlders that sometimes occur in rows as outcrops of stratified ledges. The good is always, strictly speaking, in pockets.

The limonite deposits at and near the bottom of the Lauderdale chert group is the least important of the three principal limonite horizons. The ore deposits are the outcrops of a stratified seam, in places two stratified seams, and pocket ore. The pocket ore is believed to have been derived principally from the outcrops of stratified seams. The stratified seams have never been seen over a few feet in thickness. The ore as a rule is not so good as that of the last mentioned horizon, as it is oftener rough and cherty and higher in phosphorus.

Limonite beds occur also at two horizons in and on the Lower Carboniferous formation, or in the bottom strata of the Bangor limestones and over their lower strata. The crystalline or Talladega slates carry some few extensive beds of limonite, though the ore of most of these beds is siliceous. The newer formations, Cretaceous and Tertiary, in Alabama, also carry some limonite deposits. The most important limonite horizon in Alabama, after the three principal ones mentioned above, occurs at the bottom of the Lafayette formation. The limonite beds of this horizon have been worked extensively.

It is, of course, difficult to give an average composition of the Alabama Red Mountain ores, but the three following analyses, dried at 212° F., represent the three different seams: No. 1 is an average of many stockhouse samples, made by Dr. William B. Phillips, of soft ore. The hard ores show considerable variations from different openings, but an average analysis of the ore in its natural state, as made by Dr. William B. Phillips, is given in No. 2. No. 3 gives some representative analyses from furnace samples in the natural state of ore from the Irondale vein:

*Analyses of Red Mountain ores, Alabama.*

| | 1. | 2. | 3. |
|---|---|---|---|
| | Soft ore. | Hard ore. | Irondale vein. |
| | *Per cent.* | *Per cent.* | *Per cent.* |
| Metallic iron | 47.24 | 37.00 | 52.00 to 53.50 |
| Moisture | 7.00 | .50 | ..... |
| Silica | 17.20 | 13.44 | 15.50 to 16.00 |
| Alumina | 3.35 | 3.18 | 4.50 to 5.00 |
| Lime | 1.12 | 16.20 | Trace to .50 |
| Phosphorus | ..... | .37 | .15 to .18 |
| Sulphur | ..... | .07 | ..... |
| Carbonic acid | ..... | 12.24 | ..... |
| Manganese | ..... | ..... | .20 to .30 |

No deposits of brown ores tributary to the Birmingham district have yet been found within the Bessemer limits as to phosphorus. Shipments of good qualities of brown hematite—furnace samples taken of the ore in the natural state—average, according to Mr. John S. Kennedy, 45 to 52 per cent of metallic iron, 11 to 15 per cent of silica, and from 0.4 to 0.8 per cent of phosphorus.

It will be noted that the ore is practically self-fluxing.

# THE AMERICAN IRON TRADE IN 1897 AND IMMEDIATELY PRECEDING YEARS.

By JAMES M. SWANK,
*General Manager of the American Iron and Steel Association.*

## DISTRIBUTION OF IRON AND STEEL WORKS, BY STATES.

Before we proceed to give the details of the production of the iron and steel industries of the United States in 1897 and immediately preceding years, the reader will be interested in learning from the following table how the country's iron and steel works are distributed among the several States. The table has been compiled from the fourteenth edition of the Directory to the Iron and Steel Works of the United States, published in July, 1898, by the American Iron and Steel Association.

*Number of iron and steel works and tin-plate works in the United States in 1898, by States.*

| State. | Blast furnaces. | Rolling mills and steel works. | Steel works (included in preceding column). | | | Tin-plate works. |
|---|---|---|---|---|---|---|
| | | | Bessemer. | Open-hearth. | Crucible. | |
| Maine | ..... | 1 | ..... | ..... | ..... | ..... |
| New Hampshire | ..... | 1 | ..... | 1 | ..... | ..... |
| Massachusetts | 3 | 12 | 1 | 4 | ..... | ..... |
| Rhode Island | ..... | 1 | ..... | ..... | ..... | ..... |
| Connecticut | 5 | 9 | ..... | 1 | 3 | ..... |
| New York | 19 | 23 | 1 | 4 | 4 | 3 |
| New Jersey | 10 | 21 | ..... | 5 | 6 | ..... |
| Pennsylvania | 162 | 225 | 20 | 48 | 21 | 31 |
| Delaware | ..... | 10 | ..... | 1 | ..... | ..... |
| Maryland | 8 | 5 | 1 | ..... | 1 | 4 |
| Virginia | 27 | 7 | 1 | ..... | ..... | 1 |
| West Virginia | 4 | 7 | 2 | ..... | ..... | 2 |
| Kentucky | 9 | 9 | 1 | 2 | ..... | 1 |
| Tennessee | 19 | 4 | ..... | ..... | 1 | ..... |

*Number of iron and steel works and tin-plate works in the United States*—Continued.

| State. | Blast furnaces. | Rolling mills and steel works. | Steel works (included in preceding column). | | | Tin-plate works. |
|---|---|---|---|---|---|---|
| | | | Bessemer. | Open-hearth. | Crucible. | |
| North Carolina | 2 | ..... | ..... | ..... | ..... | ..... |
| Georgia | 4 | 1 | ..... | ..... | ..... | ..... |
| Alabama | 45 | 10 | ..... | 3 | ..... | ..... |
| Texas | 4 | 1 | ..... | ..... | ..... | ..... |
| Ohio | 55 | 67 | 7 | 10 | 2 | 16 |
| Indiana | ..... | 33 | 3 | 5 | 1 | 6 |
| Illinois | 17 | 26 | 5 | 8 | 1 | 3 |
| Michigan | 13 | 3 | 1 | 1 | 1 | 1 |
| Wisconsin | 6 | 6 | 1 | 3 | 3 | ..... |
| Minnesota | 1 | 3 | ..... | 1 | ..... | ..... |
| Missouri | 3 | 7 | ..... | 1 | ..... | 1 |
| Iowa | ..... | 1 | ..... | ..... | ..... | ..... |
| Kansas | ..... | 1 | ..... | ..... | 1 | ..... |
| Colorado | 3 | 2 | 1 | ..... | ..... | ..... |
| Wyoming | ..... | 1 | ..... | ..... | ..... | ..... |
| Washington | ..... | 1 | ..... | ..... | ..... | ..... |
| Oregon | 1 | 1 | ..... | ..... | ..... | ..... |
| California | ..... | 5 | ..... | 1 | ..... | ..... |
| Total | 420 | 504 | 45 | 99 | 45 | 69 |

It will be observed, by reference to the table, that our blast furnaces are situated in 22 States, our rolling mills and steel works in 31 States, and our tin-plate works, of which there are 69, in 11 States.

Of the 420 furnaces that are mentioned, all but 79 use bituminous coal and coke and anthracite coal, the remainder using charcoal. The annual capacity of the whole number of furnaces, after making due allowance for those that are not likely to run again, was about 18,000,000 long tons in April, 1898. To the whole number of furnaces may be added 4 large new furnaces that are now in a forward state of construction, and these furnaces will add about 500,000 tons to the total annual capacity we have mentioned.

Omitting all forged products, the annual capacity in finished products of the rolling mills in April, 1898, was 17,929,850 long tons, against 14,763,920 tons in January, 1896. The number of puddling furnaces in April, 1898, each double furnace counting as two single furnaces, was 3,889, against 4,408 in January, 1896, a decrease of 519.

Of the whole number of rolling mills mentioned, 51 were prepared to roll standard, girder, light T, and other rails; 66 were equipped to manufacture all kinds of structural material, including bridge rods,

*Production of pig iron in the United States from 1890 to 1897, inclusive.*

| Year. | Production. |
|---|---|
| | *Long tons.* |
| 1890 | 9,202,703 |
| 1891 | 8,279,870 |
| 1892 | 9,157,000 |
| 1893 | 7,124,502 |
| 1894 | 6,657,388 |
| 1895 | 9,446,308 |
| 1896 | 8,623,127 |
| 1897 | 9,652,680 |

Twenty States made pig iron in 1896 and nineteen States in 1897. The following table gives the production of pig iron by States in 1896 and 1897, in the order of their prominence in 1897.

*Production of pig iron in the United States in 1896 and 1897, by States.*

| State. | 1896. | 1897. | State. | 1896. | 1897. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | | *Long tons.* | *Long tons.* |
| Pennsylvania | 4,024,166 | 4,631,634 | New Jersey | 59,163 | 95,696 |
| Ohio | 1,196,326 | 1,372,889 | Kentucky | 70,660 | 35,899 |
| Illinois | 925,239 | 1,117,239 | Missouri | 12,548 | 23,883 |
| Alabama | 922,170 | 947,831 | Georgia | 15,593 | 17,092 |
| Virginia | 386,277 | 307,610 | Connecticut | 10,187 | 8,336 |
| Tennessee | 248,338 | 272,130 | Colorado | 45,104 | 6,582 |
| New York | 206,075 | 243,304 | Texas | 1,221 | 6,175 |
| Maryland | 79,472 | 193,702 | Massachusetts | 1,873 | 3,284 |
| West Virginia | 108,569 | 132,907 | North Carolina | 2,151 | ..... |
| Michigan | 149,511 | 132,578 | | | |
| Wisconsin | 158,484 | 103,909 | Total | 8,623,127 | 9,652,680 |

The total production of 9,652,680 tons of pig iron in 1897 was divided as follows: Bessemer pig iron, 5,795,584 tons; charcoal pig iron, excluding a few tons of charcoal Bessemer, included above, 251,738 tons; basic pig iron, 556,391 tons; spiegeleisen and ferro-manganese, 173,695 tons; foundry, forge, and other kinds of pig iron, 2,875,272 tons.

Fully nine-tenths of our total production of pig iron is now made with coke, as the following figures of production in 1897 by fuels will show: Raw bituminous coal and coke, but almost entirely coke, 8,464,692 tons; mixed anthracite and coke, 911,628 tons; anthracite alone, 21,149 tons; charcoal, 255,211 tons. Much the larger part of the fuel classed as mixed anthracite and coke is composed of coke. The small quantity of

pig iron produced with anthracite alone in 1897 compares strangely with the details of production as late as 1874, in which year more pig iron was made with unmixed anthracite than with coke and raw bituminous coal combined.

Statistics collected by the American Iron and Steel Association show that the total production of pig iron in the first half of 1898 was 5,909,703 long tons, against 4,403,476 tons in the first half of 1897 and 5,249,204 tons in the second half. The increase in the first half of 1898 over the last half of 1897 was 660,499 tons; over the first half of 1897 it was 1,506,227 tons. The figures for the first half of 1898 indicate a total production in the whole year exceeding 11,500,000 tons and probably near 11,750,000 tons.

*Bessemer steel.*—Eight States made Bessemer steel in 1897, namely: New York, Pennsylvania, Maryland, West Virginia, Kentucky, Ohio, Illinois, and Michigan. The total production of Bessemer steel ingots in 1897 was 5,475,315 long tons, against 3,919,906 tons in 1896, 4,909,128 tons in 1895, 3,571,313 tons in 1894, and 3,215,686 tons in 1893. There was an increase of 1,555,409 tons, or over 39 per cent, in 1897 as compared with 1896. The production in 1897 was much the largest in our history. The following table shows the production by States of Bessemer steel ingots in the last five years. Direct castings are counted as ingots.

*Production of Bessemer steel ingots in the United States from 1893 to 1897.*

| State. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Pennsylvania .... | 2,126,220 | 2,334,548 | 2,978,924 | 2,292,814 | 3,060,049 |
| Ohio ..... | 348,141 | 363,974 | 719,954 | 568,535 | 1,041,541 |
| Illinois..... | 314,829 | 581,540 | 866,531 | 780,105 | 943,774 |
| Other States..... | 426,496 | 291,251 | 343,719 | 278,452 | 429,951 |
| Total ..... | 3,215,686 | 3,571,313 | 4,909,128 | 3,919,906 | 5,475,315 |

*Open-hearth steel.*—Twelve States made open-hearth steel in 1897, namely: Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Alabama, Ohio, Indiana, Illinois, Wisconsin, Missouri, and California. The total production of open-hearth steel ingots and direct castings in 1897 was 1,608,671 long tons, against 1,298,700 tons in 1896, an increase of 309,971 tons, or almost 24 per cent. Of the total production in 1897, 1,056,043 tons were made by the basic process and 552,628 tons by the acid process. In 1896 the production by the basic process amounted to 776,256 tons and by the acid process to 522,444 tons. The following table shows the production of open-hearth steel ingots and direct castings by States during the last six years:

*Production of open-hearth steel ingots in the United States from 1892 to 1897, inclusive.*

| State. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| New England..... | 18,620 | 24,759 | 26,204 | 36,733 | 48,055 | 51,402 |
| New York and New Jersey .... | 19,511 | 17,591 | 21,363 | 32,203 | 32,120 | 39,521 |
| Pennsylvania .... | 551,010 | 616,516 | 659,969 | 904,352 | 1,009,608 | 1,271,751 |
| Ohio ..... | 60,834 | 50,385 | 54,182 | 75,637 | 64,691 | 78,357 |
| Illinois..... | 19,914 | 28,639 | 23,218 | 49,500 | 101,832 | 120,609 |
| Other States..... | | | | 38,757 | 42,394 | 47,031 |
| Total ..... | 669,889 | 737,890 | 784,936 | 1,137,182 | 1,298,700 | 1,608,671 |

*Crucible and other steel.*—Our crucible-steel industry makes no progress, nor does the crucible-steel industry of any other country. The place of crucible steel has been largely taken by steel made by other processes. Ten States made crucible steel in 1897, namely: Connecticut, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Ohio, Indiana, Illinois, and Wisconsin. The total production in 1897 amounted to 69,959 long tons, against 60,689 tons in 1896, 67,666 tons in 1895, 51,702 tons in 1894, 63,613 tons in 1893, 84,709 tons in 1892, 72,586 tons in 1891, and 71,175 tons in 1890.

The production of steel in 1897 by various minor processes amounted to 3,012 long tons, against 2,394 tons in 1896, 858 tons in 1895, 4,081 tons in 1894, 2,806 tons in 1893, 4,548 tons in 1892, 4,484 tons in 1891, and 3,793 tons in 1890.

*Total production of steel.*—The production of all kinds of steel in 1897 was as follows: Bessemer steel, 5,475,315 long tons; open-hearth steel, 1,608,671 tons; crucible steel, 69,959 tons; all other steel, 3,012 tons; total, 7,156,957 tons, against 5,281,689 tons in 1896, 6,114,834 tons in 1895, 4,412,032 tons in 1894, 4,019,995 tons in 1893, and 4,927,581 tons in 1892.

*Rails.*—Ten States made rails in 1897, namely: Pennsylvania, Maryland, Alabama, Tennessee, Ohio, Illinois, Wisconsin, Colorado, Wyoming, and California. All these States made Bessemer steel rails except Tennessee, Alabama, and Wyoming. Iron rails were made in Pennsylvania, Tennessee, Alabama, Ohio, Illinois, Colorado, and Wyoming. Open-hearth steel rails were made in Alabama and California.

The production of all kinds of rails in the United States in 1897, including light and heavy rails, and street, electric, and mine rails, was 1,647,892 long tons, against 1,122,010 tons in 1896, an increase of 525,882 tons, or over 46 per cent. The production of 1897 was composed of 1,614,399 tons of Bessemer steel rails rolled by the producers of domestic ingots; 30,121 tons of Bessemer steel rails rerolled from old steel rails and rolled from purchased blooms; 500 tons of open-hearth steel

rails, and 2,872 tons of iron rails. The following table gives the production of all kinds of rails in the United States from 1890 to 1897.

*Production of all kinds of rails in the United States from 1890 to 1897, inclusive.*

| Year. | Iron. | Steel. | Total. | Year. | Iron. | Steel. | Total. |
|---|---|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | | *Long tons.* | *Long tons.* | *Long tons.* |
| 1890.... | 13,882 | 1,871,425 | 1,885,307 | 1894 ..... | 4,674 | 1,017,098 | 1,021,772 |
| 1891.... | 8,240 | 1,298,936 | 1,307,176 | 1895 ..... | 5,810 | 1,300,325 | 1,306,135 |
| 1892.... | 10,437 | 1,541,407 | 1,551,844 | 1896 ..... | 4,347 | 1,117,663 | 1,122,010 |
| 1893.... | 6,090 | 1,130,368 | 1,136,458 | 1897 ..... | 2,872 | 1,645,020 | 1,647,892 |

The maximum production of all kinds of rails in this country was reached in 1887, when 2,139,640 long tons were made. The year of next largest production was 1890, when we made 1,885,307 tons. The year of next largest production was 1897, the output amounting to 1,647,892 tons.

*Structural shapes.*—In this classification we include beams, beam girders, zee bars, tees, channels, angles, and other structural forms, but do not include plate girders made from plates. Nearly all the structural shapes and plates used for structural purposes are made of steel. The total production in 1896 was 495,571 long tons, and in 1897 it was 583,790 tons. In 1895 it was 517,920 tons, and in 1894 it was 360,305 tons.

*Plates and sheets.*—The production of plate and sheet iron and steel in the United States in 1897, excluding nail plate and skelp iron and steel, amounted to 1,207,286 long tons, against 965,776 tons in 1896, 991,459 tons in 1895, 682,900 tons in 1894, 674,345 tons in 1893, and 751,460 tons 1892. The production of "black plates for tinning" alone in 1897 is reported to have amounted to 271,886 long tons, against 185,387 tons in 1896, an increase of 86,499 tons, or over 46 per cent.

*Wire rods.*—The production of iron and steel wire rods in 1897 amounted to 970,736 long tons, against 623,986 tons in 1896 and 791,130 tons in 1895, showing an increase of 346,750 tons, or over 55 per cent, over 1896, and 179,606 tons over 1895.

*Wire nails.*—The production of iron and steel wire nails in 1897 amounted to 8,997,245 kegs of 100 pounds each, compared with 4,719,860 kegs in 1896, an increase of 4,277,385 kegs, or over 90 per cent. In 1895 the production amounted to 5,841,403 kegs, in 1894 to 5,681,801 kegs, and in 1893 to 5,095,945 kegs.

*Cut nails.*—In the following statistics cut spikes are included with cut nails, but railroad and other spikes and machine-made horseshoe nails are not included. The total production of cut nails in 1897 was 2,106,799 kegs of 100 pounds each, against 1,615,870 kegs in 1896, an increase of 490,929 kegs, or over 30 per cent. With the single exception of 1897 there has been a steady decline in the production of cut nails

since 1886, in which year the maximum production of 8,160,973 kegs was reached.

*Comparative nail statistics.*—The following table gives the total production of cut nails and wire nails, from 1886 to 1897, in kegs of 100 pounds:

*Production of cut nails and wire nails in the United States from 1886 to 1897, inclusive.*

| Year. | Cut nails. | Wire nails. | Year. | Cut nails. | Wire nails. |
|---|---|---|---|---|---|
| | *Kegs.* | *Kegs.* | | *Kegs.* | *Kegs.* |
| 1886 | 8,160,973 | 600,000 | 1892 | 4,507,819 | 4,719,524 |
| 1887 | 6,908,870 | 1,250,000 | 1893 | 3,048,933 | 5,095,945 |
| 1888 | 6,493,591 | 1,500,000 | 1894 | 2,425,060 | 5,681,801 |
| 1889 | 5,810,758 | 2,435,000 | 1895 | 2,129,894 | 5,841,403 |
| 1890 | 5,640,946 | 3,135,911 | 1896 | 1,615,870 | 4,719,860 |
| 1891 | 5,002,176 | 4,114,385 | 1897 | 2,106,799 | 8,997,245 |

*Total production of rolled iron and steel.*—Twenty-six States rolled either iron or steel or both iron and steel in 1897, two less than in 1896. The production of all iron and steel rolled into finished forms in the United States in 1897 was 7,001,728 long tons, against 5,515,841 tons in 1896, an increase of 1,485,887 tons, or almost 27 per cent. The following table gives the total production by States of rolled iron and steel in 1896 and 1897:

*Production of rolled iron and steel in the United States in 1896 and 1897, by States.*

| State. | 1896. | 1897. | State. | 1896. | 1897. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | | *Long tons.* | *Long tons.* |
| Maine, New Hampshire | 5,728 | 2,519 | Alabama | 31,864 | 37,763 |
| Massachusetts | 85,308 | 94,319 | Ohio | 767,020 | 1,017,124 |
| Rhode Island, Connecticut | 35,288 | 30,233 | Indiana | 198,567 | 254,376 |
| New York | 80,873 | 81,283 | Illinois | 590,975 | 863,013 |
| New Jersey | 76,522 | 86,421 | Michigan, Wisconsin, Minnesota | 137,050 | 136,016 |
| Pennsylvania | 3,138,144 | 3,956,727 | Missouri | 32,326 | 35,565 |
| Delaware | 38,818 | 43,982 | Colorado | 54,574 | 22,710 |
| Maryland | 4,826 | 82,926 | Wyoming, Washington, Oregon, California | 39,733 | 37,997 |
| Virginia | 26,129 | 26,482 | | | |
| West Virginia | 138,096 | 151,424 | | | |
| Kentucky | 25,809 | 30,968 | | | |
| Tennessee, Georgia | 8,191 | 9,940 | | | |
| | | | Total | 5,515,841 | 7,001,728 |

*Iron blooms and billets.*—The production of these articles in independent forges that are not connected with rolling mills or machine shops is a decaying industry. The iron blooms and billets produced in forges

directly from the ore in 1897 amounted to 1,455 long tons, against 1,346 tons in 1896, 40 tons in 1895, 40 tons in 1894, 864 tons in 1893, 2,182 tons in 1892, 5,290 tons in 1891, 7,094 tons in 1890, and 11,078 tons in 1889. The iron blooms produced in forges from pig and scrap iron in 1897, and which were for sale and not intended for the consumption of the makers, amounted to 7,159 long tons, against 6,494 tons in 1896, 7,185 tons in 1895, 3,221 tons in 1894, and 6,605 tons in 1893.

*Summary of statistics for 1896 and 1897.*—In the following table we summarize the leading statistical facts presented in preceding pages concerning the development of our iron and steel industries in 1896 and 1897, anticipating in the last lines information to be given hereafter.

*Summary of statistics relating to the iron and steel industries of the United States in 1896 and 1897.*

| Subject. | 1896. | 1897. |
|---|---|---|
| Production of pig iron, long tons | 8,623,127 | 9,652,680 |
| Production of spiegeleisen and ferro-manganese, included in pig iron, long tons | 131,940 | 173,695 |
| Production of bar, hoop, skelp, etc., and structural shapes, not including wire rods, long tons | 2,731,932 | 3,081,760 |
| Production of iron and steel structural shapes, included above, long tons | 495,571 | 583,790 |
| Production of iron and steel wire rods, long tons | 623,986 | 970,736 |
| Production of plate and sheet iron and steel, except nail plate, long tons | 965,776 | 1,207,286 |
| Production of iron and steel cut nails and cut spikes, kegs of 100 pounds | 1,615,870 | 2,106,799 |
| Production of iron and steel wire nails, kegs of 100 pounds | 4,719,860 | 8,997,245 |
| Production of all rolled iron and steel, including cut nails and excluding rails, long tons | 4,393,831 | 5,353,836 |
| Production of all rolled iron and steel, including both cut nails and rails, long tons | 5,515,841 | 7,001,728 |
| Production of Bessemer steel rails, long tons | 1,116,958 | 1,644,520 |
| Production of open-hearth steel rails, long tons | 705 | 500 |
| Production of iron rails, long tons | 4,347 | 2,872 |
| Production of all kinds of rails, long tons | 1,122,010 | 1,647,892 |
| Production of street rails, included above, long tons | 145,210 | 122,244 |
| Production of Bessemer steel, long tons | 3,919,906 | 5,475,315 |
| Production of open-hearth steel, long tons | 1,298,700 | 1,608,671 |
| Production of crucible steel, long tons | 60,689 | 69,959 |
| Production of blister and patented steel, long tons | 2,394 | 3,012 |

*Summary of statistics relating to the iron and steel industries, etc.*—Continued.

| Subject. | 1896. | 1897. |
|---|---|---|
| Production of all kinds of steel, long tons | 5,281,689 | 7,156,957 |
| Production of ore, pig, and scrap blooms, for sale, long tons | 7,840 | 8,614 |
| Production of tin plates and terne plates for year ending June 30, pounds | 307,228,621 | 446,982,063 |
| Value of imports of iron and steel | $19,462,561 | $13,836,204 |
| Value of exports of iron and steel | $48,670,218 | $62,737,250 |
| Imports of iron ore, long tons | 682,806 | 489,970 |

## THE IRON-ORE INDUSTRY OF CUBA.

The first considerable importation of iron ore into this country was in 1873, when about 46,000 tons were imported, the most of which came from Canada. More than one-half of our imports came from Canada in 1873, 1874, and 1875. In 1879 we commenced to import iron ore largely from the Mediterranean countries, virtually all from Spain, Algeria, and Elba. Before that year the imports from Canada had declined. In 1884 we commenced to import iron ore from Cuba, and it is from this country that our imports of iron ore are now chiefly derived. The following table shows our total imports from 1872 to 1897 from all countries:

*Imports of iron ore into the United States from 1872 to 1897, inclusive.*

| Fiscal year. | Quantity. | Calendar year. | Quantity. | Calendar year. | Quantity. |
|---|---|---|---|---|---|
| | *Long tons.* | | *Long tons.* | | *Long tons.* |
| 1872 | 23,733 | 1880 | 493,408 | 1889 | 853,573 |
| 1873 | 45,981 | 1881 | 782,887 | 1890 | 1,246,830 |
| 1874 | 57,987 | 1882 | 589,655 | 1891 | 912,856 |
| 1875 | 56,655 | 1883 | 490,875 | 1892 | 806,585 |
| 1876 | 17,284 | 1884 | 487,820 | 1893 | 526,951 |
| 1877 | 30,669 | 1885 | 390,786 | 1894 | 168,541 |
| 1878 | 28,212 | 1886 | 1,039,433 | 1895 | 524,153 |
| 1879 (fiscal) | 150,197 | 1887 | 1,194,301 | 1896 | 682,806 |
| 1879 (calendar) | 284,141 | 1888 | 587,470 | 1897 | 489,970 |

Iron ore of excellent quality, suitable for the manufacture of Bessemer steel, is found in large quantities near the coast in the province of Santiago de Cuba, in the southeastern part of the Island of Cuba, and near to the now famous city of Santiago. Three American companies have undertaken the development of these deposits of iron ore, the Juragua Iron Company, Limited, the Spanish-American Iron Company, and the Sigua Iron Company. These companies have expended large

sums in opening mines, and in building railroads, wharves, and piers. The first two of these companies mentioned have shipped many cargoes of iron ore to the United States, and they have also commenced to ship ore to foreign countries. The first shipments made by the Juragua Iron Company, Limited, were in August, 1884; the first shipments by the Spanish-American Iron Company were in 1895, and the first shipments by the Sigua Iron Company were in October, 1892. The imports of Cuban iron ore into the United States from 1884 to the close of 1897, included in the above table, were as follows:

*Imports of Cuban iron ore into the United States from 1884 to 1897, inclusive.*

| Year. | Quantity. | Year. | Quantity. | Year. | Quantity. |
|---|---|---|---|---|---|
| | *Long tons.* | | *Long tons.* | | *Long tons.* |
| 1884 | 21,798 | 1889 | 256,278 | 1894 | 150,439 |
| 1885 | 81,106 | 1890 | 362,068 | 1895 | 386,044 |
| 1886 | 111,710 | 1891 | 266,377 | 1896 | 409,883 |
| 1887 | 97,711 | 1892 | 330,357 | 1897 | 397,173 |
| 1888 | 198,048 | 1893 | 362,685 | | |

During 1897 the Juragua Iron Company, Limited, exported to the United States 244,817 long tons of iron ore from its Cuban mines, which was a decrease of 53,482 tons as compared with its total exports in 1896. In addition, 5,932 tons were exported by this company to Pictou, Nova Scotia, in 1897. Of the quantity exported by this company in 1897 there were received at Philadelphia 32 cargoes, containing 113,060 tons, and at Baltimore 40 cargoes, containing 131,757 tons. The total exports of iron ore by this company to the United States from 1884 to the close of 1897 amounted to 3,076,827 tons, shipped in 1,103 cargoes.

The Spanish-American Iron Company shipped 74,992 long tons of iron ore from its Cuban mines in 1895. In 1896 the shipments to the United States amounted to 111,584 tons, and in 1897 to 152,356 tons, of which latter quantity 36,919 tons were received at Philadelphia and 115,437 tons at Baltimore. The same company also shipped 51,537 tons of iron ore to various foreign countries in 1897, as follows: to Antwerp, 17,834 tons; to Newcastle-on-Tyne, 6,491 tons; to Glasgow, 10,712 tons; to Pictou, Nova Scotia, 8,916 tons; to Cardiff, 3,800 tons; and to Rotterdam, 3,784 tons.

No iron ore was shipped in 1894, 1895, 1896, or 1897 from the Cuban mines of the Sigua Iron Company. This company exported 14,022 long tons of iron ore in 1893 and 7,830 tons in 1892, when its first shipments were made.

Shipments of iron ore from Cuba were interrupted by the war with Spain, but have been resumed since the termination of hostilities in August last. A great increase in shipments may now be expected as compared with previous years.

Manganese ores are not of frequent occurrence in the United States, but they are an essential raw material in the manufacture of Bessemer and open-hearth steel. Manganese mines of great extent and richness were opened in the interior of the province of Santiago de Cuba a few years ago, and a branch railroad was built which connected them with a railroad to the coast. One cargo of ore was shipped to the United States before the breaking out of the Cuban insurrection in 1895, when operations were stopped until peace should be restored. The mines are situated at Ponupo, and the company mining them is styled the Ponupo Iron Company, the stockholders being Pennsylvanians. The company has recently made arrangements to commence active work at the mines, when shipments to the United States will doubtless be resumed.

## THE MANUFACTURE OF TIN PLATES IN THE UNITED STATES.

The manufacture of tin plates in the United States was undertaken in 1873 at Wellsville, Ohio, and at Leechburg, Pennsylvania. In 1875 it was also undertaken at Demmler, near Pittsburg. Owing, however, to the low duty which was imposed on foreign tin plates, domestic tin plates ceased in 1878 to be made at the three places mentioned, and no further attempts to establish the tin-plate industry in our country were made until about the time of the passage of the tariff act of October 1, 1890, in which the previously existing duty on tin plates was more than doubled. Since that date the tin-plate industry in the United States has grown with wonderful rapidity, the production in the six fiscal years beginning with July 1, 1891, and ending with June 30, 1897, having been as follows, in long tons:

*Production of tin and terne plates in the United States from 1892 to 1897, inclusive.*

[Fiscal years.]

| Articles. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Tin plates..... | 2,026 | 20,421 | 36,433 | 53,718 | 94,906 | 158,638 |
| Terne plates..... | 4,066 | 24,141 | 25,720 | 32,800 | 42,250 | 40,908 |
| Total ..... | 6,092 | 44,562 | 62,153 | 86,518 | 137,156 | 199,546 |

The total production of tin plates in the six fiscal years from 1892 to 1897 was 366,142 long tons; of terne plates, 169,885 tons; total, 536,027 tons. In April, 1898, there were in the United States 69 completed tin-plate works, and 1 additional works was in course of erection.

The following table, compiled from the publications of the Bureau of Statistics of the Treasury Department, shows the quantities of tin plates and terne plates imported into the United States in each calendar year from 1872 to 1897, with their foreign values. It shows a steady and rapid decline in imports since 1891.

*Imports of tin plates and terne plates into the United States from 1872 to 1897, inclusive.*

| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| | *Long tons.* | | | *Long tons.* | |
| 1872..... | 85,629 | $13,893,450 | 1885..... | 228,596 | $15,991,152 |
| 1873..... | 97,177 | 14,240,868 | 1886..... | 257,822 | 17,504,976 |
| 1874..... | 79,778 | 13,057,658 | 1887..... | 283,836 | 18,699,145 |
| 1875..... | 91,054 | 12,098,885 | 1888..... | 298,238 | 19,762,961 |
| 1876..... | 89,946 | 9,416,816 | 1889..... | 331,311 | 21,726,707 |
| 1877..... | 112,479 | 10,679,028 | 1890..... | 329,435 | 23,670,158 |
| 1878..... | 107,864 | 9,069,967 | 1891..... | 327,882 | 25,900,305 |
| 1879..... | 154,250 | 13,227,659 | 1892..... | 268,472 | 17,102,487 |
| 1880..... | 158,049 | 16,478,110 | 1893..... | 253,155 | 15,559,423 |
| 1881..... | 183,005 | 14,886,907 | 1894..... | 215,068 | 12,053,167 |
| 1882..... | 213,987 | 17,975,161 | 1895..... | 219,545 | 11,482,380 |
| 1883..... | 221,233 | 18,156,773 | 1896..... | 119,171 | 6,140,161 |
| 1884..... | 216,181 | 16,858,650 | 1897..... | 83,851 | 4,366,828 |

The statistics of the production of tin plates and terne plates in the United States in the fiscal year 1898 are not yet available, but there are good reasons for assuming that the total production in that year would amount to almost 300,000 tons. This production, according to the latest statistical information in our possession, is equal to if not in excess of the production of Great Britain in 1897, so that in a period of seven years we have built up a tin-plate industry that already equals that of our tin-plate rival. But for the drawback provision in all our recent tariffs we would not now import any tin plates or terne plates.

## OUR IMPORTS AND EXPORTS OF IRON AND STEEL.

Less than twenty years ago the imports of iron and steel into this country were of extraordinary magnitude, notwithstanding the fact that we possessed all the natural resources for the production of these articles that were possessed by any other country, and notwithstanding the further fact that we were not lacking in either the skill or the capital that was necessary to develop these resources. But we had not been able to assemble the raw materials or to manufacture iron or steel as cheaply as our European competitors, and the duties on iron and steel were not sufficient in many instances to counterbalance the increased cost of production at home. Long distances were to be overcome in bringing the raw materials together, and railroad freight rates were still exceedingly onerous. The cost of labor was very much higher than in Europe. The American market was therefore in large part controlled by foreign manufacturers.

In the supply of tin plates and terne plates, which we have elsewhere referred to, foreigners enjoyed a complete monopoly of our market.

Duties on wire rods, cotton ties, crude steel, and even pig iron and bar iron were wholly insufficient to prevent large importations. Gradually, however, as the direct result of the encouragement afforded by protective duties, which led to the improvement of processes, the substitution of more powerful machinery, and the development of new fields of iron-ore supply, the cost of production in all lines in this country has approximated that of European countries, so that to-day, with the help of low railroad rates, our manufacturers of iron and steel not only control their own home market under an exceedingly moderate scale of duties but have entered into active competition with their European rivals in the supply of the world's markets. The great change that has taken place in our imports and exports of iron and steel will be seen at a glance in the following tables, which we have compiled from the reports of the Bureau of Statistics of the Treasury Department.

The following table gives the foreign values of all our imports of iron and steel, including pig iron, bar iron, plate and sheet iron, tin plates, wire rods, iron and steel rails, cotton ties, crude steel, fire arms, hardware, machinery, cutlery, etc., in the calendar years from 1871 to 1897:

*Value of all imports of iron and steel and manufactures thereof into the United States from 1871 to 1897, inclusive.*

| Year. | Value. | Year. | Value. | Year. | Value. |
|---|---|---|---|---|---|
| 1871 | $57,866,299 | 1880 | $80,443,362 | 1889 | $42,027,742 |
| 1872 | 75,617,677 | 1881 | 61,555,077 | 1890 | 44,540,413 |
| 1873 | 60,005,538 | 1882 | 67,075,125 | 1891 | 41,983,626 |
| 1874 | 37,652,192 | 1883 | 47,506,306 | 1892 | 33,882,447 |
| 1875 | 27,363,101 | 1884 | 37,078,122 | 1893 | 29,656,539 |
| 1876 | 20,016,603 | 1885 | 31,144,552 | 1894 | 20,843,576 |
| 1877 | 19,874,399 | 1886 | 41,630,779 | 1895 | 25,772,136 |
| 1878 | 18,013,010 | 1887 | 56,420,607 | 1896 | 19,462,561 |
| 1879 | 33,331,569 | 1888 | 42,311,689 | 1897 | 13,836,204 |

The following table gives the total value of our exports of iron and steel and manufactures thereof in the calendar years from 1871 to 1897. These exports embrace chiefly machinery, builders' hardware, sewing machines, saws, shovels, axes, hatchets, and other tools, locomotives, car wheels, printing presses, iron and steel bridges, firearms, scales and balances, pig iron, steel rails, cut nails, wire nails, wire, miscellaneous castings, and engines and boilers, but do not include agricultural implements, which are composed largely of iron and steel.

*Value of all exports of iron and steel and manufactures thereof from the United States from 1871 to 1897, inclusive.*

| Year. | Value. | Year. | Value. | Year. | Value. |
|---|---|---|---|---|---|
| 1871 | $14,185,359 | 1880 | $15,156,703 | 1889 | $23,712,814 |
| 1872 | 12,595,539 | 1881 | 18,216,121 | 1890 | 27,000,134 |
| 1873 | 14,173,772 | 1882 | 22,348,834 | 1891 | 30,736,507 |
| 1874 | 17,312,239 | 1883 | 22,716,040 | 1892 | 27,900,862 |
| 1875 | 17,976,833 | 1884 | 19,290,895 | 1893 | 30,159,363 |
| 1876 | 13,641,724 | 1885 | 16,622,511 | 1894 | 29,943,729 |
| 1877 | 18,549,922 | 1886 | 14,865,087 | 1895 | 35,071,563 |
| 1878 | 15,101,899 | 1887 | 16,235,922 | 1896 | 48,670,218 |
| 1879 | 14,223,646 | 1888 | 19,578,489 | 1897 | 62,737,250 |

The decline in our imports of iron and steel and the increase in our exports are still better illustrated in the statistics of both movements in the fiscal year 1898, ending on June 30, 1898. In this year we imported iron and steel and manufactures of iron and steel amounting, in foreign value, to $12,214,938, and our exports of articles in the same classification, not including agricultural implements, amounted to $70,405,923. It is worthy of note that our exports of agricultural implements, which are mainly composed of iron and steel, have also greatly increased in the last fiscal year. For several years these exports had averaged between $4,000,000 and $5,000,000 in value annually, but in the fiscal year 1898 they amounted to $7,609,732.

It is possible to give the details of only a part of our exports of iron and steel. The following table gives the quantities of leading articles of iron and steel and the values of all articles of iron and steel exported in the fiscal year 1898:

*Quantity and value of articles of iron and steel exported from the United States in 1898.*

| Exports—Fiscal year ending June 30, 1898. | Quantity. | Value. |
|---|---|---|
| | *Long tons.* | |
| Ferro-manganese | 8,403 | $344,743 |
| All other pig iron | 228,465 | 2,385,252 |
| Scrap and old, for remanufacture | 60,195 | 632,334 |
| Bar iron | 4,769 | 163,261 |
| Band, hoop, or scroll iron | 1,552 | 47,327 |
| Bars, or rods of steel, other than wire | 16,864 | 470,052 |
| Steel wire rods | 14,464 | 330,022 |
| Billets, ingots, and blooms | 16,100 | 290,827 |
| Cut nails and spikes | 14,424 | 612,234 |
| Wire nails | 10,221 | 458,787 |
| All other nails, including tacks | 1,923 | 245,722 |

*Quantity and value of articles of iron and steel exported from United States, etc.*—Cont'd.

| Exports—Fiscal year ending June 30, 1898. | Quantity. | Value. |
|---|---|---|
| | *Long tons.* | |
| Iron plates and sheets | 4,057 | $182,809 |
| Steel plates and sheets | 12,215 | 354,579 |
| Iron rails | 2,769 | 37,150 |
| Steel rails | 229,783 | 4,613,376 |
| Structural iron and steel | 30,586 | 1,183,482 |
| Wire | 61,185 | 2,593,306 |
| Locomotive engines, whole number, 468 | ..... | 3,883,719 |
| Locks, hinges, and other builders' hardware | ..... | 3,997,796 |
| Saws and tools | ..... | 2,430,536 |
| Other iron and steel manufactures | ..... | 45,148,609 |
| Total | 717,975 | 70,405,923 |

The calendar year 1880 was the year of largest importations of iron and steel, both in quantities and values. In that year we imported 1,886,019 tons of iron and steel the weight of which was ascertained, and in addition we imported large quantities of machinery, hardware, cutlery, firearms, etc., the weight of which was not ascertained. The value of the total importations of iron and steel in 1880 was $80,443,362. The imports of 1880 included 700,864 tons of pig iron, 113,381 tons of bar iron, 118,267 tons of iron rails, 141,277 tons of steel rails, and 619,887 tons of scrap iron and scrap steel. In the following year, 1881, we imported still larger quantities of iron and steel rails—122,333 tons of the former and 222,596 tons of the latter, but of some other articles there was a decline in the imports.

In the fiscal year 1898 we imported only 529 tons of iron and steel rails, 1,502 tons of scrap iron and scrap steel, 15,177 tons of bar iron, and 25,640 tons of pig iron, most of which was spiegeleisen and ferromanganese, while in the same fiscal year we exported, as has been shown in the table above given, 236,868 tons of all kinds of pig iron, 60,195 tons of scrap iron and scrap steel, 229,783 tons of steel rails, 30,586 tons of structural steel, and 61,185 tons of wire.

It is interesting to note the first steps that were made in the development of our export trade in iron and steel and articles made from them. Twenty-two years ago we summarized in one of our Annual Statistical Reports the progress we had already made in finding markets abroad for our iron and steel products. In 1838 the Baldwin Locomotive Works of Philadelphia exported 3 engines, their first shipment to a foreign country, and up to February 1, 1876, they had exported in all 389 engines, valued at $5,005,964. The increase in the number of engines annually sent abroad by these celebrated works had been quite marked since 1869, when 12 engines were built for shipment to foreign

countries, followed in 1870 by 15, in 1871 by 19, in 1872 by 45, and in 1873 by 96. The fact was noted that the Phœnix Bridge Works of Pennsylvania had just sold eight or ten iron bridges to the Great Western Railway of Canada, and had recently sold from thirty to forty iron bridges to the Grand Trunk Railway of Canada and additional bridges to various other Canadian railways.

Our growing export trade in railway cars and agricultural implements was referred to, as was also that in platform and other scales, fire engines, stationary engines, stoves, firearms, hardware, cutlery, and edge tools. At that time the Collins ax and the Ames shovel had proved their superiority by capturing Australian and other markets, and the incident was cited of Mr. Gladstone having recently cut down a large tree with an American ax in preference to an English ax. We had already sent abroad large quantities of cut nails and spikes, chilled car wheels, Hoe's printing presses, hydraulic machinery, and other machinery. We had made a good beginning in building up an export trade in the manufactures of iron and steel, but we had as yet accomplished little worthy of mention in the exportation of pig iron, bar iron, rails, and other crude or heavy forms of iron and steel, and it looked as if we never would accomplish anything in this direction that would gratify our national pride. What we have recently accomplished in the exportation of all lines of iron and steel products has been shown in the tables already given.

Our early triumphs in the exportation of manufactured articles of iron and steel were due almost wholly to the superior quality and adaptability, as well as, in some instances, to the novelty, of these articles, and rarely, if ever, to their cheapness. Now our iron and steel products of every description are sent abroad, not only because they are superior in quality and design, but also because they are produced and sold at low prices.

## THE WORLD'S PRODUCTION OF PIG IRON AND STEEL.

On February 21, 1856, the Hon. Abram S. Hewitt, then plain Mr. Hewitt, read a paper before the American Geographical and Statistical Society, at New York, "On the Statistics and Geography of the Production of Iron," in which, for the first time, so far as we are informed, an attempt was made to ascertain the world's production of pig iron. Mr. Hewitt was compelled to estimate the production of several countries, but the total production which he obtained for the world was substantially correct. He found that the total production in 1855, forty-three years ago, was, in round numbers, 7,000,000 long tons. Great Britain's percentage of the total production approximated 50 per cent, while that of the United States was less than 15 per cent.

Twenty years ago, in a review of the iron and steel exhibits at the Universal Exposition at Paris in 1878, we made an attempt to ascertain the world's production of both pig iron and steel in that year, and the

figures then collated from the best available sources we subsequently revised and printed in our Annual Report for 1889. The results then obtained we now reproduce below, including the percentage of production by each country. Long tons are used for Great Britain and the United States and metric tons for all other countries, metric tons being used as the equivalent of long tons in ascertaining total production. Our figures show that the world's production of pig iron just doubled from 1855 to 1878.

*The world's production of pig iron and steel in 1878.*

| Countries. | Pig iron. | | Steel. | |
|---|---|---|---|---|
| | Production. | Percentage. | Production. | Percentage. |
| | *Tons.* | | *Tons.* | |
| Great Britain | 6,381,051 | 44.74 | 1,063,027 | 36.14 |
| United States | 2,301,215 | 16.13 | 731,977 | 24.88 |
| Germany and Luxemburg | 2,147,641 | 15.06 | 489,151 | 16.63 |
| France | 1,521,274 | 10.67 | 312,921 | 10.64 |
| Belgium | 518,646 | 3.64 | 102,772 | 3.49 |
| Austria and Hungary | 434,250 | 3.04 | 129,416 | 4.40 |
| Russia | 417,239 | 2.93 | 66,593 | 2.26 |
| Sweden | 340,858 | 2.39 | 25,918 | 0.88 |
| Spain | 60,000 | 0.42 | 250 | 0.01 |
| Italy | 20,000 | 0.14 | 3,000 | 0.10 |
| Other countries | 120,000 | 0.84 | 16,750 | 0.57 |
| Total | 14,262,174 | 100.00 | 2,941,775 | 100.00 |

It will be seen that Great Britain made 44.74 per cent of the world's production of pig iron in 1878 and that the United States made 16.13 per cent, Great Britain retaining her leadership of 1855 and almost retaining her large percentage of production in that year, while the percentage of the United States in 1878 was almost the same as in 1855, and a very low percentage it was, Germany and Luxemburg making almost as much pig iron as the United States in 1878. Great Britain's production of steel in 1878 was more than one-third of the world's production, while that of the United States was less than one-fourth.

We now present a table showing the world's production of pig iron and steel in 1897, or in the most recent years for which statistics are available, compiled in most instances from official data, the unofficial figures approaching absolute accuracy. Tons are used as in the preceding table. The figures show that the world's production of pig iron more than doubled from 1878 to 1897, and that the world's production of steel increased more than sevenfold in the same period.

*The world's production of pig iron and steel in 1897.*

| Countries. | Pig iron. | | | Steel. | | |
|---|---|---|---|---|---|---|
| | Year. | Production. | Percentage. | Year. | Production. | Percentage. |
| | | *Tons.* | | | *Tons.* | |
| United States | 1897 | 9,652,680 | 29.30 | 1897 | 7,156,957 | 34.58 |
| Great Britain | 1897 | 8,789,455 | 26.69 | 1897 | 4,585,961 | 22.16 |
| Germany and Luxemburg | 1897 | 6,879,541 | 20.89 | 1896 | 4,796,226 | 23.17 |
| France | 1897 | 2,472,143 | 7.51 | 1897 | 1,312,000 | 6.34 |
| Belgium | 1897 | 1,034,732 | 3.14 | 1897 | 616,604 | 2.98 |
| Austria and Hungary | 1896 | 1,217,782 | 3.70 | 1896 | 880,696 | 4.25 |
| Russia | 1897 | 1,868,671 | 5.67 | 1895 | 879,075 | 4.25 |
| Sweden | 1897 | 538,197 | 1.63 | 1897 | 275,128 | 1.33 |
| Spain | 1897 | 297,100 | 0.90 | 1897 | 101,800 | 0.49 |
| Italy | 1897 | 8,393 | 0.03 | 1897 | 63,940 | 0.31 |
| Canada | 1897 | 53,796 | 0.16 | 1897 | 18,400 | 0.09 |
| Other countries | 1897 | 125,000 | 0.38 | 1897 | 10,000 | 0.05 |
| Total | ..... | 32,937,490 | 100.00 | ..... | 20,696,787 | 100.00 |

The table shows that in 1897 the United States produced 29.30 per cent of the world's production of pig iron and 34.58 per cent of its production of steel, while Great Britain's share of the total production of pig iron was 26.69 per cent, and its share of the total production of steel was 22.16 per cent—the United States having passed since 1878 to the front as a producer of both pig iron and steel, Great Britain taking second place in the production of pig iron and third place in the production of steel, Germany and Luxemburg being second in steel production. The relative position of the United States in the production of pig iron and steel and all iron and steel products will be fully maintained in 1898, as there has been very great activity throughout the year in all branches of our iron and steel industries.

Since the above table was prepared and put in type we have received the statistics of the production of all kinds of steel in Germany and Luxemburg in 1897. The total production was 5,119,300 metric tons. This production will entitle Germany and Luxemburg to a larger percentage of the world's production of steel than is given in the table, but it will not materially modify the percentage of other countries. It brings up the world's total production of steel to 21,019,861 tons.

# THE FOREIGN IRON TRADE IN 1897 AND IMMEDIATELY PRECEDING YEARS.

By JAMES M. SWANK,
*General Manager of the American Iron and Steel Association.*

As in the United States, there was a general advance all along the line in the foreign iron trade in 1897 and in the first half of 1898. The iron and steel industries of Great Britain, Germany, Belgium, France, Sweden, Russia, and Austria-Hungary were all active and prices were well maintained. The iron and steel industries of Great Britain would have been more active than they were but for the occurrence in July, 1897, of one of the most determined struggles between capital and labor that has ever occurred, the great English and Scotch organization of machinists known as the Amalgamated Engineers imposing conditions which the Employers' Federation refused to accept. A strike of almost a hundred thousand men followed and lasted seven months, until the end of January, 1898, when the men surrendered. While it continued the iron trade of Great Britain was greatly embarrassed, especially the shipbuilding interest. With this exception, however, the European iron trade was prosperous all through 1897, and it has been equally prosperous thus far in 1898. It had been prosperous also in the latter half of 1895 and in the whole of 1896.

## GREAT BRITAIN.

The British Iron Trade Association estimates the production of pig iron in Great Britain in 1897 at 8,789,455 long tons, against an ascertained production of 8,659,681 tons in 1896, these being the official Government figures. The largest annual production of pig iron by Great Britain, as officially ascertained, was in 1896. The next largest production was 8,586,680 tons in 1882. The production in the first half of 1898 is estimated by the British Iron Trade Association to have amounted to 4,432,893 tons, indicating a total production for the year equal to that of any preceding year.

According to the authority just quoted the production of Bessemer steel ingots in Great Britain in 1897 was 1,884,155 long tons, against

1,815,842 tons in 1896, and the production of Bessemer steel rails was 921,131 tons, against 817,476 tons in 1896. There were 70 Bessemer converters at work in 1897 and 12 were idle. The production of open-hearth steel ingots in 1897 was 2,601,806 tons, against 2,317,555 tons in 1896. The production of open-hearth steel rails in 1897 was 31,694 tons. The Bessemer steel ingots produced in 1897 were divided into 1,374,339 tons of acid and 509,816 tons of basic steel. The open-hearth steel ingots produced in 1897 were divided into 2,393,718 tons of acid and 208,088 tons of basic steel. The total number of acid open-hearth furnaces is now 316 and 15 are building. The total number of basic open-hearth furnaces is 37 and 4 are building.

The production of Bessemer steel rails in Great Britain in 1897 was 921,131 tons, against 817,476 tons in 1896. Great Britain also made 31,694 tons of open-hearth steel rails in 1897, against 30,058 tons in 1896.

The British Iron Trade Association has ascertained that the production of Bessemer steel ingots in Great Britain in the first half of 1898 amounted to 913,151 tons, against 997,159 tons in the first half of 1897, 905,522 tons in the first half of 1896, and 801,860 tons in the first half of 1895. The production of Bessemer steel rails in the first half of 1898 was 436,385 tons. The same authority has ascertained that the production of open-hearth steel in the United Kingdom in the first half of 1898 amounted to 1,305,771 tons, against 1,353,768 tons in the corresponding half of 1897.

Strange as it may seem, the production of puddled iron in Great Britain has actually increased in late years. The production of puddled bars in 1897 was 1,238,159 tons, against 1,214,005 tons in 1896 and 1,148,012 tons in 1895.

The maximum annual production of iron ore in Great Britain was attained in 1882, when 18,031,957 tons were mined. Since that year there was a steady decline in production until 1893, when the quantity mined was only 11,203,476 tons. Since 1893 there has been a gradual increase in production, the figures for 1896 being 13,700,764 tons and for 1897 being 13,787.878 tons. As far back as 1870 the production was 14,370,655 tons.

The production of coal in Great Britain in 1897 was 202,129,931 tons, against 195,361,260 tons in 1896 and 189,661,362 tons in 1895.

The total exports of iron and steel from Great Britain to all countries in 1897 amounted to 3,691,065 tons, against 3,550,398 tons in 1896 and 2,835,541 tons in 1895. During the last four years the imports of iron and steel into Great Britain have largely increased. They amounted to 361,300 tons in 1897, against 292,908 tons in 1894. Great Britain imported from Germany and Belgium in 1897 about 76,000 tons of beams and girders, valued at nearly a million pounds sterling. During the same year 18,036 tons of steel rails were exported from Germany to England. The imports of pig iron and steel into Great Britain from the United States in the first seven months of 1897 and 1898 were as

follows: Pig iron, 1897, 47,848 tons; 1898, 33,724 tons; steel, 1897, 24,011 tons; 1898, 15,674 tons.

The exports of iron and steel from Great Britain to all countries in the first seven months of 1898 amounted to 1,931,572 long tons, against 2,183,485 tons in the same months of 1897 and 1,999,211 tons in the same months of 1896. The exports of tin plates to the United States in the same period amounted to 45,162 tons, against 56,564 tons in the first seven months of 1897 and 73,552 tons in the same months of 1896.

## GERMANY.

This country is making more rapid progress in the production of iron and steel than any other European country. Its iron and steel statistics embrace the production of Luxemburg.

The production of pig iron in Germany and Luxemburg in 1897 was 6,879,541 metric tons, according to Dr. Rentzsch, the statistician of the Association of German Iron and Steel Manufacturers, against 6,372,575 tons in 1896 and 5,464,501 tons in 1895. Of the production in 1897 Germany made 6,007,083 tons and Luxemburg 872,458 tons. In the first seven months of 1898 the production of pig iron in Germany amounted to 4,219,325 metric tons. The production of all kinds of finished steel in Germany and Luxemburg in 1897 is reported to us by Dr. Rentzsch to have amounted to 5,119,300 metric tons. The production of finished steel in 1896 amounted to 4,796,226 metric tons. Of the pig iron now annually produced in Germany and Luxemburg, about 50 per cent is Thomas, or basic, pig iron.

The production of iron ore in Germany and Luxemburg in 1897 amounted to 15,448,212 metric tons, of which Germany produced 10,099,202 tons and Luxemburg 5,349,010 tons. In 1896 the total production amounted to 14,162,335 tons, of which Germany produced 9,403,594 tons and Luxemburg 4,758,741 tons.

The total production of coal in Germany in 1897 amounted to 120,431,056 metric tons, of which 91,007,624 tons were bituminous coal and 29,423,432 tons were brown coal. In 1896 the total production of coal was 112,471,106 tons, of which 85,690,233 tons were bituminous coal and 26,780,873 tons were brown coal.

## FRANCE.

The production of pig iron in France in 1897 was 2,472,143 metric tons, against 2,339,537 tons in 1896 and 2,003,868 tons in 1895. The production of Bessemer steel ingots in France in 1897 amounted to 806,853 tons, against 726,463 tons in 1896, and the production of open-hearth steel ingots in 1897 was 474,742 tons, against 454,280 tons in 1896. The total production of Bessemer and open-hearth steel ingots in 1897 was 1,281,595 metric tons, against 1,180,743 tons in 1896. These statistics are given upon the authority of the Comité des Forges de France, and are provisional for 1897. For 1896 they are final.

The production of iron ore in France in 1896, not including Algeria, amounted to 4,062,390 metric tons, against 3,679,767 tons in 1895. Official statistics for 1897 have not yet appeared.

The production of coal in France in 1897 amounted to 30,735,353 metric tons, against 29,189,900 tons in 1896 and 28,019,893 tons in 1895.

## ALGERIA.

The iron ore mined in Algeria in 1896 amounted to 374,476 metric tons, against 318,416 tons in 1895. These are official figures.

## BELGIUM.

The production of pig iron in Belgium in 1897 amounted to 1,034,732 metric tons, against 959,414 tons in 1896 and 829,234 tons in 1895. The production of steel ingots in Belgium in 1897 amounted to 616,604 metric tons, against 598,974 tons in 1896 and 454,619 tons in 1895. The production of pig iron in the first seven months of 1898 was 585,095 tons. The production of iron ore in Belgium in 1896 amounted to 307,031 metric tons, against 312,637 tons in 1895.

The production of coal in Belgium in 1897 amounted to 21,534,629 tons, against 21,252,370 tons in 1896 and 20,450,604 tons in 1895.

## AUSTRIA-HUNGARY.

The production of pig iron in Austria alone in 1897 was 887,945 metric tons, against 816,967 tons in 1896. Statistics for Hungary for 1897 are not yet at hand. In 1896 the production of pig iron in that country amounted to 400,815 tons. The production of both countries in 1896 was 1,217,782 tons.

The production of Bessemer and open-hearth steel in Austria-Hungary in 1896 amounted to 880,696 metric tons, against 744,547 tons in 1895. Of the total production in 1896, 343,861 tons were made by the Bessemer process and 536,835 tons by the open-hearth process. Almost all the open-hearth steel produced in Austria-Hungary is now made by the basic process. About two-thirds of the Bessemer steel is also produced by the same process. The following are the figures for 1896: Acid Bessemer steel, 120,103 tons; basic Bessemer steel, 223,758 tons; total, 343,861 tons. Acid open-hearth steel, 23,000 tons; basic open-hearth steel, 513,835 tons; total, 536,835 tons.

The production of iron ore in Austria alone in 1897 amounted to 1,613,876 tons. Iron-ore statistics for 1897 have not yet been received for Hungary. In 1896 the total production of iron ore in the whole of Austria-Hungary amounted to 2,718,295 metric tons, of which Austria produced 1,448,615 tons and Hungary 1,269,680 tons.

The production of coal in Austria alone in 1897 amounted to 30,950,863 metric tons, of which 20,458,092 tons were brown coal and 10,492,771 tons were stone coal. The production of coal in Hungary in 1896, the latest year for which we have statistics, amounted to 4,894,353 tons, of

which 3,761,728 tons were brown coal and 1,132,625 tons were stone coal. The total production of all kinds of coal in the Austro-Hungarian Empire in 1896, for which year we have complete statistics for both countries, amounted to 33,676,411 tons, against 32,654,777 tons in 1895.

## SWEDEN.

The production of pig iron in Sweden in 1897 was 538,197 metric tons, against 494,418 tons in 1896 and 462,930 tons in 1895. The production of Bessemer steel ingots in Sweden in 1897 was 107,679 tons, against 114,120 tons in 1896, and the production of open-hearth steel ingots was 165,836 tons, against 142,301 tons in 1896. The production of crucible-steel ingots in 1897 was 691 tons, against 604 tons in 1896; and the production of blister steel in 1897 was 922 tons, against 624 tons in 1896. The production of iron ore in 1897 was 2,087,166 tons, against 2,039,019 tons in 1896. The exports of iron ore from Sweden in 1897 amounted to 1,400,399 metric tons, against 1,150,695 tons in 1896, 800,452 tons in 1895, 831,395 tons in 1894, 484,055 tons in 1893, and 320,071 tons in 1892. The production of coal and lignite in Sweden in 1897 amounted to 224,343 tons, against 225,848 tons in 1896.

## SPAIN.

The production of pig iron in Spain in 1897 amounted to 297,100 metric tons, against 246,326 tons in 1896 and 206,452 tons in 1895. The production of Bessemer steel ingots in Spain in 1897 amounted to 63,200 tons, against 62,511 tons in 1896, and the production of open-hearth steel ingots in 1897 amounted to 38,600 tons, against 42,066 tons in 1896.

The production of iron ore in Spain in 1897 appears to have been the largest in the history of the country, amounting to 7,468,500 metric tons, against 6,762,582 tons in 1896 and 5,514,339 tons in 1895. There were exported 6,884,588 tons in 1897, against 6,272,588 tons in 1896, of which Great Britain took 5,091,027 tons in 1897 and 4,635,959 tons in 1896.

The estimated production of coal and lignite in Spain in 1897 amounted to 1,939,400 metric tons, against 1,908,360 tons in 1896. Of the total quantity 55,900 tons were classed as lignite in 1897 and 55,413 tons were so classed in 1896. All the statistics we have given for Spain for 1897 are preliminary and are subject to revision.

## ITALY.

The production of pig iron in Italy in 1897 amounted to 8,393 metric tons, against 6,987 tons in 1896. The production of all kinds of finished steel in 1897 was 63,940 tons, against 65,955 tons in 1896. The production of iron ore in 1897, nearly all of which was mined on the Island of Elba, amounted to 200,709 tons, against 203,966 tons in 1896. The production of coal in 1897 (anthracite, lignite, and bituminous) amounted to 314,222 tons, against 276,197 tons in 1896.

## RUSSIA.

According to a recent issue of the Bulletin Russe de Statistique Financière et de Législation the production of pig iron in Russia and Finland in 1897 amounted to 1,868,671 metric tons, against 1,612,069 tons in 1896, 1,452,380 tons in 1895, 1,332,505 tons in 1894, 1,148,937 tons in 1893, 1,071,813 tons in 1892, 1,004,923 tons in 1891, and 926,482 tons in 1890.

The same authority says that the production of all kinds of steel in Russia, including Finland, amounted in 1895 to 879,075 metric tons, as compared with 726,017 tons in 1894, 630,796 tons in 1893, 514,986 tons in 1892, 433,477 tons in 1891, and 378,422 tons in 1890. The production of steel ingots in Russia in 1897 is given by another authority as amounting to 1,153,000 metric tons and the production of rolled steel to 868,000 metric tons.

According to the same authority the production of iron ore in Russia amounted to 2,924,963 metric tons in 1895, against 2,484,938 tons in 1894, 2,194,102 tons in 1893, 2,044,106 tons in 1892, 1,958,452 tons in 1891, and 1,795,663 tons in 1890.

The same authority says that the production of coal and lignite in Russia amounted to 9,463,300 metric tons in 1896, against 9,098,800 tons in 1895, 8,762,600 tons in 1894, 7,122,500 tons in 1893, 6,946,200 tons in 1892, 6,233,200 tons in 1891, and 6,015,000 tons in 1890. The production of lignite in Russia is very small; in 1895 it amounted to only 133,000 tons.

## DOMINION OF CANADA.

The production of pig iron in the Dominion of Canada in 1897, as ascertained from the manufacturers by the American Iron and Steel Association, was 53,796 long tons, against 60,030 tons in 1896. The production of steel in 1897, all made by the open-hearth process, as ascertained by the same authority, was 18,400 long tons, against 16,000 tons in 1896. The production of all kinds of iron and steel rolled into finished forms, excluding muck and scrap bars, billets, etc., amounted to 77,021 long tons in 1897, against 75,043 tons in 1896 and 66,402 tons in 1895.

The production of coal in the Dominion of Canada in 1897 is reported to have amounted to 3,460,894 long tons, against 3,344,389 tons in 1896. The production of coke, all made in Nova Scotia and British Columbia, amounted to 70,367 long tons in 1897, against 44,303 tons in 1896. The production of iron ore in 1897 was 63,796 long tons, against 82,059 tons in 1896. The figures for 1897 are all subject to revision.

Canada now has 8 completed blast furnaces and 1 building, 17 rolling mills, and 1 open-hearth steel plant. The new furnace that is being built is at Deseronto, Ontario. It is now nearly completed.

# MANGANESE ORES.

By JOHN BIRKINBINE.

## PRODUCTION OF MANGANESE ORES.

As stated in previous reports, the known manganese deposits in this country are generally uncertain as to extent, and surface indications are often deceiving. The influence of a small increase in the phosphorus content upon the commercial values of ores has also restricted the output of this mineral and forced the country to rely upon foreign sources for the greater portion of its supply. Notwithstanding these obstacles, the year 1897 shows a slight increase over the output in 1896, from 10,088 to 11,108 long tons, and the total value from $90,727 to $95,505. The average value, however, has fallen from $8.99 to $8.60 per ton.

Seven States contributed to the total in the year 1897, Georgia, Arkansas, and Virginia being the principal producers. Virginia, which was formerly the leading producer of manganese ores, has in late years fallen off considerably, but in 1896 and 1897 showed a moderate advance, and may in the future take a more prominent position.

The total production of manganese ores in each State, total value, and average value per ton in 1896 and 1897 are given below:

*Amount and value of manganese ores produced in the United States in 1896 and 1897.*

| State. | 1896. | | | 1897. | | |
|---|---|---|---|---|---|---|
| | Product. | Value. | Value per ton. | Product. | Value. | Value per ton. |
| | *Long tons.* | | | *Long tons.* | | |
| Arkansas | 3,421 | $36,686 | $10.72 | 3,240 | $33,708 | $10.40 |
| California | 284 | 3,415 | 12.02 | 484 | 2,788 | 5.76 |
| Georgia | 4,085 | 27,032 | 6.62 | 3,332 | 22,084 | 6.63 |
| Michigan | ..... | ..... | ..... | 37 | 370 | 10.00 |
| North Carolina | 2 | 17 | 8.50 | ..... | ..... | ..... |
| Pennsylvania | 265 | 1,988 | 7.50 | 354 | 2,832 | 8.00 |
| Tennessee | None. | None. | ..... | 11 | 93 | 8.45 |
| Virginia | 2,018 | 21,485 | 10.65 | 3,650 | 33,630 | 9.21 |
| West Virginia | 13 | 104 | 8.00 | None. | None. | None. |
| Total | 10,088 | 90,727 | 8.99 | 11,108 | 95,505 | 8.60 |

No manganese ore was reported in 1897 from North Carolina and West Virginia, which in 1896 contributed small amounts. Michigan and Tennessee supplied manganese ore in 1897, but none in 1896.

The production of the three prominent States, the total amount mined, and the total value for the years 1880 to 1897, inclusive, are given in the following table:

*Production of manganese ores in the United States from 1880 to 1897.*

[Maxima are given in italics.]

| Year. | Virginia. | Arkansas. | Georgia. | Other States. | Total. | Total value. |
|---|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | |
| 1880 | 3,661 | ..... | 1,800 | 300 | 5,761 | $86,415 |
| 1881 | 3,295 | 100 | 1,200 | 300 | 4,895 | 73,425 |
| 1882 | 2,982 | 175 | 1,000 | 375 | 4,532 | 67,980 |
| 1883 | 5,355 | 400 | ..... | 400 | 6,155 | 92,325 |
| 1884 | 8,980 | 800 | ..... | 400 | 10,180 | 122,160 |
| 1885 | 18,745 | 1,483 | 2,580 | 450 | 23,258 | 190,281 |
| 1886 | *20,567* | 3,316 | 6,041 | 269 | 30,193 | 277,636 |
| 1887 | 19,835 | 5,651 | *9,024* | 14 | *34,524* | *333,844* |
| 1888 | 17,646 | 4,312 | 5,568 | 1,672 | 29,198 | 279,571 |
| 1889 | 14,616 | 2,528 | 5,208 | 1,845 | 24,197 | 240,559 |
| 1890 | 12,699 | 5,339 | 749 | *6,897* | 25,684 | 219,050 |
| 1891 | 16,248 | 1,650 | 3,575 | 1,943 | 23,416 | 239,129 |
| 1892 | 6,079 | *6,708* | 826 | ..... | 13,613 | 129,586 |
| 1893 | 4,092 | 2,020 | 724 | 882 | 7,718 | 66,614 |
| 1894 | 1,797 | 1,934 | 1,277 | 1,300 | 6,308 | 53,635 |
| 1895 | 1,715 | 2,991 | 3,856 | 985 | 9,547 | 71,769 |
| 1896 | 2,018 | 3,421 | 4,085 | 564 | 10,088 | 90,727 |
| 1897 | 3,650 | 3,240 | 3,332 | 886 | 11,108 | 95,505 |
| Total. | 163,980 | 46,068 | 50,845 | 19,482 | 280,375 | 2,730,211 |

The total amounts produced in the last eighteen years are given to indicate the local sources of manganese ores.

## PRODUCTION OF MANGANIFEROUS IRON ORES.

For the year 1897 the production of manganiferous iron ores is included in the report of the iron ores of the United States, but the total amount of such ores mined and their valuation is also stated here.

In the Lake Superior region the iron ores from some of the mines carry limited percentages of manganese. Vermont, for the first time in years, contributed a small amount of manganiferous iron ore, while in Colorado considerable amounts of both manganiferous iron ore and manganiferous silver ore were mined and used in the smelters as a flux.

*Production of manganiferous iron ores in 1897.*

| Locality. | Quantity. | Percentage manganese. | Average value per ton at mine. | Total value. |
|---|---|---|---|---|
| | *Long tons.* | | | |
| Colorado | 16,519 | 27 to 31 | $2.40 | $39,565 |
| Lake Superior region | 184,585 | 4 to 14.5 | 1.64 | 301,819 |
| Vermont | 1,200 | 10 to 20 | 2.00 | 2,400 |
| Total | 202,304 | 4 to 31 | 1.70 | 343,784 |

The total production and value of manganiferous iron ore in the United States from 1889 to 1897 has been as follows:

*Total production of manganiferous iron ores in the United States from 1889 to 1897.*

[Maxima in italics.]

| Year. | Total product. | Total value. | Average value per ton. |
|---|---|---|---|
| | *Long tons.* | | |
| 1889 | 83,434 | $271,680 | $3.26 |
| 1890 | 61,863 | 231,655 | *3.74* |
| 1891 | 132,511 | 314,099 | 2.37 |
| 1892 | 153,373 | 354,664 | 2.31 |
| 1893 | 117,782 | 283,228 | 2.40 |
| 1894 | 205,488 | 408,597 | 1.99 |
| 1895 | 125,729 | 233,998 | 1.86 |
| 1896 | *338,712* | *726,413* | 2.14 |
| 1897 | 202,304 | 343,784 | 1.70 |

## PRODUCTION OF MANGANIFEROUS SILVER ORES.

In the smelting of precious metals considerable amounts of manganiferous and argentiferous iron ores are used, and as most of the manganiferous silver ores contain iron, these have been included in the production of iron ore, but are stated below for reference.

*Production of manganiferous silver ores in the United States from 1889 to 1897.*

[Maxima in italics.]

| Year. | Containing 20 per cent and over. | Containing less than 20 per cent. | Total. | Total value. | Average value per ton. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | | |
| 1889 | 9,987 | 55,000 | 64,987 | $227,455 | $3.50 |
| 1890 | 7,826 | 44,014 | 51,840 | 181,440 | 3.50 |
| 1891 | 19,560 | 59,951 | 79,511 | 397,555 | 5.00 |
| 1892 | 17,047 | 45,262 | 62,309 | 323,794 | *5.20* |
| 1893 | 12,642 | *a* 43,320 | *a* 55,962 | 258,695 | 4.75 |
| 1894 | 12,460 | *b* 19,227 | *b* 31,687 | 148,292 | 4.84 |
| 1895 | 11,789 | 42,374 | 54,163 | 229,651 | 4.24 |
| 1896 *c* | ..... | ..... | 138,079 | 416,020 | 3.01 |
| 1897 *c* | ..... | ..... | *149,502* | *424,151* | 2.84 |

*a* Including 1,500 tons from Montana, for which no value is given.

*b* Including 1,049 tons from Montana, for which no value is given.

*c* In 1896 and 1897 the product was not subdivided upon arbitrary percentages of manganese, for reasons given in the report for 1896.

## PRODUCTION OF MANGANIFEROUS ZINC RESIDUUM.

In treating the zinc ores of New Jersey, the resulting clinker or residuum, which carries considerable iron and manganese, is used in the manufacture of spiegeleisen. The total annual production, total value, and average value per ton from 1889 to 1897 will be found in the table below:

*Production of manganiferous zinc ore residuum in the United States from 1889 to 1897.*

[Maxima in italics.]

| Year. | Quantity. | Value. | Average value per ton. |
|---|---|---|---|
| | *Long tons.* | | |
| 1889 | 43,648 | $54,560 | $1.25 |
| 1890 | *48,560* | *60,700* | 1.25 |
| 1891 | 38,228 | 57,432 | *1.50* |
| 1892 | 31,859 | 25,937 | .81 |
| 1893 | 37,512 | 30,535 | .81 |
| 1894 | 26,981 | 20,464 | .76 |
| 1895 | 43,249 | 24,451 | .57 |
| 1896 | 44,953 | 20,455 | .46 |
| 1897 | 33,924 | 18,713 | .55 |

## PRODUCTION OF MANGANESE AND MANGANIFEROUS ORES.

The total production of all classes of manganese and manganiferous ores in the United States during the year 1897 may be given in summarized form as follows:

*Production of manganese and manganiferous ore in the United States in 1897.*

| Kind of ore. | Quantity. | Value. | Average value per ton. |
|---|---|---|---|
| | *Long tons.* | | |
| Manganese ore | 11,108 | $95,505 | $8.60 |
| Manganiferous iron ore | 202,304 | 343,784 | 1.70 |
| Manganiferous silver ore | 149,502 | 424,151 | 2.84 |
| Manganiferous zinc ore | 33,924 | 18,713 | .55 |
| Total | 396,838 | 882,153 | *a* 2.22 |

*a* Average.

The following notes are offered concerning the production of manganese ores and manganiferous iron ores in the various States.

## PRODUCTION OF MANGANESE IN VARIOUS STATES.

### ARKANSAS.

For several years there has been little change in the output of manganese ores in the Batesville district, and the production for 1897 approximates the average for the past three years, 3,200 tons. An examination of the appended statement will indicate that in the past twelve years the average output of ore from this district has been 3,606 tons. It is possible that if railroad connections were extended toward the White River from Cushman, and the extension so located as to pass close to the known deposits, a considerable increase could be expected. But the district is distant from the points of consumption, and the expense of mining, added to freight rates, makes the ore costly when delivered to blast furnaces. No new developments have been reported in the deposits in the southwestern portion of the State.

*Production of manganese in the Batesville district of Arkansas to December 31, 1897.*

| Year. | Authority. | Long tons. |
|---|---|---|
| 1850 to 1867 | Estimated | 400 |
| 1868 | do | 10 |
| 1881 | Railroad reports of shipments | 100 |
| 1882 | do | 175 |
| 1883 | do | 400 |
| 1884 | do | 800 |
| 1885 | Mineral Resources of the United States | 1,483 |
| 1886 | do | 3,316 |
| 1887 | do | 5,651 |
| 1888 | do | 4,312 |
| 1889 | Eleventh Census | 2,528 |
| 1890 | Mineral Resources of the United States | 5,339 |
| 1891 | do | 1,650 |
| 1892 | do | 6,708 |
| 1893 | do | 2,180 |
| 1894 | do | 1,934 |
| 1895 | do | 2,991 |
| 1896 | do | 3,421 |
| 1897 | do | 3,240 |

## CALIFORNIA.

Exploited deposits of manganese are found in the counties of Alameda, Marin, Napa, San Benito, San Luis Obispo, Santa Clara, and Sonoma, but only some of those in Alameda County are now operated even on a moderate scale.

The following table will show the production in such years as it was reported:

*Total production of manganese ores in California to December 31, 1897.*

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1874 to 1888 | 6,000 | 1894 | 278 |
| 1889 | 53 | 1895 | 525 |
| 1890 | 386 | 1896 | 284 |
| 1891 | 705 | 1897 | 484 |
| 1892 | ..... | Total | 9,115 |
| 1893 | 400 | | |

## COLORADO.

In last year's reports full analyses were given of a number of Colorado manganiferous iron ores and manganiferous silver ores.

In these silver ores the percentage of silver, manganese, and iron are constantly varying, and it is difficult to give the exact amounts of ore produced containing 20 per cent or over of manganese and those under that percentage. All the ores have therefore been grouped in 1897 as in 1896.

The following table gives the production of this class of ore from 1889 to 1897, and shows a material advance in quantity:

*Production of manganiferous ores in Colorado from 1889 to 1897.*

| | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|
| Manganiferous iron ores used for spiegeleisen.. | *Long tons.* 2,075 | ..... | *Long tons.* 964 | *Long tons.* 3,100 | *Long tons.* 5,766 |
| Manganiferous silver ores with 20 per cent and over of manganese ..... | 9,987 | 7,826 | 19,560 | 17,047 | 12,642 |
| Manganiferous silver ores with less than 20 per cent of manganese ..... | 55,000 | 44,014 | 59,951 | 45,262 | 41,820 |
| Total..... | 67,062 | 51,840 | 80,475 | 65,409 | 60,228 |

| | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| Manganiferous iron ores used for spiegeleisen.. | *Long tons.* 7,022 | *Long tons.* 13,464 | *Long tons.* 9,072 | *Long tons.* 16,519 |
| Manganiferous silver ores with 20 per cent and over of manganese ..... | 12,460 | 11,789 | | |
| Manganiferous silver ores with less than 20 per cent of manganese ..... | 17,727 | 41,717 | 137,597 | 149,502 |
| Total..... | 37,209 | 66,970 | 146,669 | 166,021 |

## GEORGIA.

No new developments are reported from Georgia, and the production of manganese ores in 1897 was less than in either 1895 or 1896.

*Production of manganese ores in Georgia from 1866 to 1897, inclusive.*

| Year. | Quantity. | Year. | Quantity. |
|---|---|---|---|
| | *Long tons.* | | *Long tons.* |
| 1866 | 550 | 1882 | 1,000 |
| 1867 | | 1883 and 1884 | (a) |
| 1868 | | 1885 | 2,580 |
| 1869 | | 1886 | 5,981 |
| 1870 | 5,000 | 1887 | 9,024 |
| 1871 | | 1888 | 5,568 |
| 1872 | | 1889 | 8,208 |
| 1873 | | 1890 | 749 |
| 1874 | 2,400 | 1891 | 3,575 |
| 1875 | 2,400 | 1892 | 826 |
| 1876 | 2,400 | 1893 | 724 |
| 1877 | 2,400 | 1894 | 1,277 |
| 1878 | 2,400 | 1895 | 3,856 |
| 1879 | 2,400 | 1896 | 4,085 |
| 1880 | 1,800 | 1897 | 3,332 |
| 1881 | 1,200 | | |

a None reported.

## LAKE SUPERIOR REGION.

Manganese, in relatively small percentages, occurs in many of the iron ores mined in the Lake Superior district, but the amount in the greater portion is below 1 per cent, and therefore is not an item of importance. Some few ores, however, have a larger portion of manganese, and the prices received are in a measure governed by this percentage. The amounts of this character of ore produced in 1897, and also in previous years, is given below, together with the approximate manganese content.

*Production of manganiferous iron ores in the Lake Superior region from 1886 to 1897.*

| Year. | Product. | Average per cent of manganese. | Year. | Product. | Average per cent of manganese. |
|---|---|---|---|---|---|
| | *Tons.* | | | *Tons.* | |
| 1886 | 100,000 | 2 | 1894 | 50,763 | 3.07 |
| | 157,000 | 4 | | 57,872 | 3.55 |
| Total | 257,000 | | | 6,264 | 6.50 |
| 1887 | 200,000 | 4 | | 61,817 | 7.26 |
| | 10,000 | 10 | | 14,610 | 7.75 |
| Total | 210,000 | | | 7,140 | 18 |
| 1888 | 189,574 | 4 | Total | 198,466 | |
| | 11,562 | 11 | 1895 | 13,752 | 8 |
| Total | 201,136 | | | 10,228 | 7.608 |
| 1889 | 50,018 | 6.74 | | 10,000 | 7.5 |
| | 31,341 | 9+ | | 26,500 | 7.26 |
| Total | 81,359 | | | 51,785 | 3.536 |
| 1890 | 61,863 | | Total | 112,265 | |
| 1891 | 13,711 | 4.68 to 17.96 | 1896 | 69,139 | 7.44 |
| | 11,015 | 10 | | 47,000 | 5.75 |
| | 9,213 | 9.68 | | 18,900 | 5 |
| | 98,572 | 5.38 | | 104,156 | 4.3 |
| Total | 132,511 | | | 38,590 | 3.22 |
| 1892 | 6,710 | 4.893 | | 51,855 | 3.1 |
| | 102,695 | 5 | Total | 329,640 | |
| | 7,500 | 8 | 1897 | 18,000 | 4 |
| | 8,272 | 9.998 | | 38,489 | 5.85 |
| | 22,254 | 12.028 | | 92,872 | 6.99 |
| Total | 147,431 | | | 30,500 | 7.57 |
| 1893 | 27,353 | 4.67 | | 35 | 14.5 |
| | 55,009 | 7.61 | | 4,689 | (a) |
| | 15,102 | 7.77 | Total | 184,585 | |
| | 5,051 | 10.40 | | | |
| | 7,833 | 14 | | | |
| | 300 | 22 | | | |
| Total | 110,648 | | | | |

a Not given.

## PENNSYLVANIA.

This State is comparatively a small producer of manganese ores. Statistics of its production in late years are as follows:

*Amount of manganese ores produced in Pennsylvania from 1894 to 1897.*

| Year. | Production. | Value. |
|---|---|---|
| | *Tons.* | |
| 1894 | 35 | ..... |
| 1895 | 460 | $2,300 |
| 1896 | 265 | 1,988 |
| 1897 | 354 | 2,832 |

## VIRGINIA.

Virginia occupied in 1897 the rank which it has held for some years as the largest producer of manganese ore in the United States. The amount mined, however, is less than in former years.

*Occurrence.*—Concerning the Virginia ores Mr. Charles Catlett states, in the Engineering and Mining Journal, that the manganese deposits, which lie along the western base of the Blue Ridge are found at the same horizon more or less from Vermont to Georgia, and apparently reach their greatest development in the valley of Virginia. But the marked success of the single mine at Crimora and the comparative failure of other developments along the same belt give interest to a description of the ores based on recent investigation. These ores are found in a well-defined belt a short distance above the Potsdam sandstone, which is well developed in the central part of the State, to which this description more especially applies. This sandstone aids in forming the most western ridge of the mountain. Its upper bed is at times very hard, being a semivitrified quartzite, and its characteristic worm borings are only visible on weathering. It passes all the way from this into partially or entirely decomposed material, forming at times a clean, white siliceous sand, and at others a very fine siliceous material with a slight greenish cast, which is called "clay" by the native miners.

The mineral belt containing iron and manganese ores is found a short distance above this quartzite—indeed, often in contact with it—while 100 feet would probably mark the limit of separation. This has not been generally accepted owing to the existence of concealed folds and displacements in the sandstone which may make the separation appear greater, and also to the occasional extensive disintegration of the upper layer of sandstone into the soft siliceous material referred to. From the similarity of their occurrence the iron ores and the manganese ores

were probably originally formed under identical conditions, and the passage of pure iron into highly manganiferous iron ore or low-grade manganese ore is common. While iron ore low in manganese is often associated with good manganese ore, the actual passage of one into the other has not been observed, and, without any known reason, the existence at any point of the one ore apparently implies an absence or marked limitation of the other.

While greatly varying in character and thickness from point to point, iron and manganese ores are found along this belt for a distance of 150 miles or more so persistently as to give support to the theory of continuity and of contemporaneous formation. This is as equally true where manganese predominates as where iron ore predominates. At Stanley a series of borings, some of them over 300 feet deep, reaching probably 400 feet below the outcrop and extending over a considerable distance, have all disclosed the bed of manganese-bearing clay a short distance above the Potsdam sandstone. At Elkton this bed has been followed to a considerable depth for three-quarters of a mile or more, and while at times it has thinned out to a few inches, the lead of ore has never been lost, and there has been given to the character of the work a permanency which appears unique. Near 120-Mile Siding borings have shown a similar condition. At other points persistent float over a long distance, together with the information furnished by extensive mining for iron ore, implies a like formation. The inference is that throughout this section there is found, a short distance above the Potsdam sandstone, one or more bands of clay-carrying iron ore, manganese ore and manganiferous iron ore, the preponderance of one of these occurring from point to point and often to the exclusion of the others.

*Character of ores.*—The ore of these beds is almost entirely psilomelane, though other varieties occur. It is commonly nodular, the spherical forms predominating, and concretionary layers are often conspicuous. The nodules are usually of small size. The ore is commonly dull in fracture, but often bright and dark blue. It passes all the way from a high-grade ore to a highly clayey or siliceous material. The presence of visible free silica along this bed is not common, but the ore is sometimes accompanied by small amounts of black flint. Occasionally the nodules are joined together in a larger mass or more or less flat sheet, and at others the clay may form so small a portion of the whole as to permit it to be spoken of as a mass of manganese ore, but as a rule the nodules are well separated from each other.

*Composition.*—In analyses the ores of this belt are not usually of high grade, although at some points such has proved to be the case. In general they may be expected to run from 40 to 50 per cent manganese, from 0.10 to 0.30 per cent phosphorus, and 10 to 20 per cent silica. Small quantities of copper, nickel, and cobalt are common. The following analyses of well-selected samples from small openings on the

line of the ore near Vesuvius, and covering a distance of some miles, are submitted:

*Analyses of manganese ore near Vesuvius, Virginia.*

| | 1. | 2. | 3. | 4. | 5. |
|---|---|---|---|---|---|
| | *Per cent.* | *Per cent.* | *Per cent.* | *Per cent.* | *Per cent.* |
| Silica | 15.000 | 10.600 | 12.300 | 5.250 | 3.25 |
| Iron | 2.800 | 1.450 | 1.450 | 11.300 | 0.97 |
| Phosphorus | 0.114 | 0.116 | 0.125 | 0.196 | 0.10 |
| Manganese | 42.610 | 47.060 | 46.590 | 44.560 | 47.37 |

*Deposition.*—There are two forms of secondary deposits, derived in whole or in part from the above, which are of importance. One of these is simply the natural result of the breaking down and washing of this bed, and may result in concentration of the ore, although at times the opposite is the case. In the latter event the distribution of the ore has not uncommonly deceived prospectors or raised unreasonable expectations. Where collection has taken place these deposits may prove of special value, but possess great irregularity and give few evidences as to their probable location. There is undoubtedly also another kind of secondary deposit formed by solution and redeposition. That this is going on now and has gone on in the past is unquestionable, and some, if not the greater part, of such ore must come from the beds referred to, not necessarily as they now stand, but as they formerly stood, or as they are worn down by the action of disintegrating forces. We find the ore in process of forming, and the water which passes from the manganese beds carrying manganese in solution and redepositing manganese in its course. The springs which break from the Potsdam, and which are remarkable in their purity, often carry manganese in minute quantities, and may contribute their share to the formation of these secondary deposits. Such deposits often exhibit a high degree of purity and concentration, with the possibility of large quantity and the certainty of great irregularity.

As might be anticipated from the mode of formation, the ores of these last deposits differ considerably from the other ores. The difference is more apparent, of course, in the prevalence of certain forms than in their exclusion from the latter. The existence of soft manganese (pyrolusite) of very pure quality is not unusual, but does not appear in large quantities. Heavy beds of wad, carrying crystals of pyrolusite, and another oxide of manganese, probably polianite, disseminated through the mass, are common, as is also the occurrence in such material of numerous small quartz crystals. It must be evident that a mining operation may encounter all three forms, and this often happens, as they may pass into each other. From the geological conditions, the Crimora mine must include all three. At Elkton the original bed alone is worked.

The character of the float, the openings examined in widely separated localities, and the analyses made, lead to the conclusion that this horizon can be expected to furnish only medium-grade ores, but recollecting the bright example of Crimora, the less extensive though apparently permanent success of Elkton, and the absolute inefficiency and insufficiency of most of the investigating work, it does not seem unreasonable to believe that future developments will disclose large and profitable supplies of ore.

Mr Walcott C. Foster, C. E., of New York, has furnished descriptions of a number of manganese deposits which he has examined in Smythe, Tazewell, Boutetourt, and Rockbridge counties.

He states that eleven different deposits show:

| | Per cent. |
|---|---|
| Manganese | 27.47 to 50.389 |
| Iron | 1.80 to 14.956 |
| Silica | 2.4 to 24.38 |
| Phosphorus | 0.138 to 0.249 |

The following table indicates the production of manganese ore in Virginia from 1880 to 1897:

*Production of manganese ores and manganiferous iron ores in Virginia from 1880 to 1897.*

| Year. | Manganese ores. | Manganiferous iron ores. | Year. | Manganese ores. | Manganiferous iron ores. |
|---|---|---|---|---|---|
| | *Tons.* | *Tons.* | | *Tons.* | *Tons.* |
| 1880 | 3,661 | ..... | 1889 | 14,616 | ..... |
| 1881 | 3,295 | ..... | 1890 | 12,699 | ..... |
| 1882 | 2,982 | ..... | 1891 | 16,248 | ..... |
| 1883 | 5,355 | ..... | 1892 | 6,079 | 2,842 |
| 1884 | 8,980 | ..... | 1893 | 4,092 | 1,188 |
| 1885 | 18,745 | ..... | 1894 | 1,797 | 132 |
| 1886 | 20,567 | ..... | 1895 | 1,715 | ..... |
| 1887 | 19,835 | ..... | 1896 | 2,018 | ..... |
| 1888 | 17,646 | ..... | 1897 | 3,650 | ..... |

Small amounts of manganese ores were also obtained from Michigan and Tennessee, and 1,200 tons of manganiferous iron ore was reported from Vermont in 1897. The residuum before referred to was derived from the zinc ores of New Jersey.

## IMPORTS.

As in previous years, the greater portion of the manganese ores used in the United States came from foreign countries, and the total amount imported in 1897 was the greatest recorded—119,961 long tons, valued at $1,023,824, or $8.54 per long ton. Russia was the largest contributor, followed by the British East Indies, Chile, Brazil, and Turkey in Europe. This is the first year that Brazil has exported a large quantity of manganese ore to this country, and it is probable, from the

efforts now being made, that her excellent beds will be extensively exploited. Only 14 tons of manganese ore were received from Nova Scotia, and Colombia furnished 3,378 tons. These deposits were referred to in the 1896 report.

The following table, supplied by the Bureau of Statistics, United States Treasury Department, shows the importation of manganese ore by ports, together with the countries from which the ore was shipped, but not necessarily where it was mined. The high valuation placed on ores from Germany, Scotland, and Nova Scotia is probably due to their adaptability to the chemical industry.

*Manganese ores imported into the United States during the calendar year 1897, by countries.*

| Country. | Quantity. | Value. |
|---|---|---|
| | *Tons.* | |
| France | 8,928 | $121,424 |
| Germany | 419 | 18,320 |
| Russia, on the Black Sea | 38,910 | 316,140 |
| Turkey in Europe | 10,908 | 109,856 |
| England | 2,856 | 23,270 |
| Scotland | 169 | 8,516 |
| Nova Scotia, etc | 14 | 875 |
| Mexico | 57 | 832 |
| Dutch West Indies | 226 | 2,260 |
| Cuba | 6,992 | 81,126 |
| Brazil | 12,083 | 117,349 |
| Chile | 12,805 | 84,812 |
| Colombia | 3,378 | 25,890 |
| British East Indies | 17,400 | 73,567 |
| Japan | 4,816 | 39,587 |
| Total | 119,961 | 1,023,824 |

*Manganese ores imported into the United States during the calendar year 1897, by customs districts.*

| Customs district. | Quantity. | Value. |
|---|---|---|
| | *Tons.* | |
| Baltimore, Md | 11,464 | $121,099 |
| Boston and Charlestown, Mass | 25 | 835 |
| New York, N. Y | 11,593 | 143,332 |
| Philadelphia, Pa | 96,411 | 753,337 |
| Newport News, Va | 370 | 1,064 |
| Corpus Christi, Tex | 57 | 832 |
| Paso del Norte, Tex | 1 | 125 |
| Pittsburg, Pa | 40 | 3,200 |
| Total | 119,961 | 1,023,824 |

It will be noted that the greatest quantity of imported manganese ore (slightly more than 80 per cent) was consigned to Philadelphia for shipment by rail to steel works, the principal part of the balance being about equally divided between New York and Baltimore.

The amounts and values of manganese ore imported in the last nine years are also given for comparison.

*Manganese ores imported and entered for consumption into the United States, from 1889 to 1897.*

| Year. | Ore. | | Oxide of. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Long tons.* | | *Long tons.* | |
| 1889 | 4,135 | $72,391 | 151 | $6,000 |
| 1890 | 33,998 | 509,704 | 156 | 7,196 |
| 1891 | 28,624 | 371,594 | 201 | 9,024 |
| 1892 | 58,364 | 830,006 | 208 | 10,805 |
| 1893 | 67,717 | 860,832 | 396 | 19,406 |
| 1894 | *a* 44,655 | 432,561 | ..... | ..... |
| 1895 | *a* 86,111 | 747,910 | ..... | ..... |
| 1896 | *a* 31,489 | 250,468 | ..... | ..... |
| 1897 | *a* 119,961 | 1,023,824 | ..... | ..... |

*a* Not classified as ore and oxide.

*Relative quantities and values of domestic and imported manganese ores from 1889 to 1897.*

| Year. | Domestic production. | | Foreign imports. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Long tons.* | | *Long tons.* | |
| 1889 | 24,197 | $240,559 | 4,286 | $78,391 |
| 1890 | 25,684 | 219,050 | 34,154 | 516,900 |
| 1891 | 23,416 | 239,129 | 28,825 | 380,618 |
| 1892 | 13,613 | 129,586 | 58,572 | 840,811 |
| 1893 | 7,718 | 66,614 | 68,113 | 880,238 |
| 1894 | 6,308 | 53,635 | 44,655 | 432,561 |
| 1895 | 9,547 | 71,769 | 86,111 | 747,910 |
| 1896 | 10,088 | 90,727 | 31,489 | 250,468 |
| 1897 | 11,108 | 95,505 | 119,961 | 1,023,824 |
| Total for 9 years | 131,679 | 1,206,574 | 476,166 | 5,151,721 |
| Average for 9 years | 14,631 | 134,064 | 52,907 | 572,413 |

## WORLD'S PRODUCTION OF MANGANESE ORES.

The following résumé of the production and value of manganese ores in various parts of the world is presented, the years taken being as nearly contemporaneous as possible. It is possible that some of the ores included are manganiferous iron ore rather than manganese ores. Effort has been made, however, to eliminate these from the table, which shows the world's production of manganese ores so far as data are obtainable.

*World's production of manganese ores.*

| Country. | Year. | Product. |
|---|---|---|
| North America: | | *Long tons.* |
| United States | 1897 | 11,108 |
| Nova Scotia *a* | 1897 | 100 |
| Cuba | 1897 | None. |
| South America: | | |
| Brazil *a* | 1897 | 12,083 |
| Chile *a* | 1895 | 10,748 |
| Colombia *a* | 1896 | 10,500 |
| Europe: | | |
| Austria | 1895 | 4,283 |
| Bosnia | 1896 | 6,713 |
| France *a* | 1896 | 30,797 |
| Germany *a* | 1896 | 44,350 |
| Greece | 1896 | 10,974 |
| Italy | 1896 | 1,860 |
| Portugal | 1896 | 1,470 |
| Russia *a* | 1897 | 235,000 |
| Spain | 1897 | *b* 90,000 |
| Sweden | 1896 | 2,024 |
| Turkey *a* | ..... | *b* 15,000 |
| Asia: | | |
| India *a* | 1895 | 15,816 |
| Japan *a* | 1895 | 16,052 |
| Oceanica: | | |
| New South Wales | 1895 | 3 |
| New Zealand | 1895 | 210 |
| Queensland | 1896 | 300 |
| South Australia | 1895 | 48 |

*a* Countries so marked contributed to the manganese supply of the United States in 1897, and in addition ore was obtained from Mexico, and the Dutch West Indies.

*b* Estimated.

## PRODUCTION OF MANGANESE IN FOREIGN COUNTRIES.

### WEST INDIES.

#### CUBA.

Unsettled local conditions in Cuba, followed by war with Spain, has interfered with the exportation of manganese ores, and no attempt at mining was made at the Ponupo manganese mines, which are situated in the southeastern portion of the island, in the province of Santiago de Cuba. The stock of this company is principally owned by parties in the United States. There were 6,992 long tons of Cuban ore imported into the United States in 1897. Changed conditions may favor a more liberal exploitation of these deposits.

The record, so far as obtainable, is as follows:

*Exportation of manganese ores from Santiago district, Cuba, from 1888 to 1897.*

| Year. | Tons. |
|---|---|
| 1888 | 1,942 |
| 1889 | 704 |
| 1890 | 21,810 |
| 1891 | 21,987 |
| 1892 | 18,751 |
| 1893 | 10,640 |
| 1895 | 1,394 |
| 1896 | (?) |
| 1897 | (?) |

#### ST. MARTIN.

It is reported that a valuable bed of manganese ore of superior quality in the island of St. Martin, West Indies, will be operated by an American company.

### SOUTH AMERICA.

#### BRAZIL.

Considerable exploitation of the manganese deposits of Brazil has been attempted, and, in 1897, 12,083 long tons of this ore were shipped to the United States. Messrs. Leech, Harrison & Forwood estimated that the total shipments in 1897 will be from 15,000 to 20,000 tons, and that the ore yields 52 per cent of metallic manganese, 4 per cent of silica, and 0.04 per cent of phosphorus. Messrs. Dreyfus et Cie, of Paris, locate the producing mines in the district of Miguel, Burnier (State of

Minas Geraes), and report that the assays of the first cargo showed manganese varying from 50 to 61 per cent, phosphorus 0.04 per cent, and silica 0.92 per cent, while the second cargo yielded manganese 50 per cent, phosphorus 0.43 per cent, and silica 1.70 per cent.

The Iron Age states that the mines are about 310 miles distant from Rio Janeiro, transportation to that port occupying from eight to ten days. They are situated at an elevation of 4,000 feet above the sea, in a pleasant, healthful climate. It also states that most of the output of ore in 1897 was sent to the United States. Previously the ore was exported to England.

## CHILE.

This country has a number of deposits of high-grade manganese ores, but it is difficult to secure exact statistics, the table below giving the annual production from 1885 to 1895. The United States obtained 12,805 tons of ore from Chile in 1897. The ore is shipped from Coquimbo and Carrizal, that from the former port being preferred. It yields, according to Messrs. Leech, Harrison, and Forwood, 48 per cent of metallic manganese, 9 per cent of silica, and .01 per cent of phosphorus, with but little iron.

*Production of Chilean manganese ores, 1885 to 1895.*

| Year. | Total. |
|---|---|
| | *Long tons.* |
| 1885 | 4,041 |
| 1886 | 23,928 |
| 1887 | 47,521 |
| 1888 | 18,713 |
| 1889 | 28,683 |
| 1890 | 47,986 |
| 1891 | 34,462 |
| 1892 | 47,894 |
| 1893 | 36,096 |
| 1894 | 21,426 |
| 1895 | 10,748 |

## EUROPE.

The character and general location of European manganese deposits having been discussed in former reports, the figures of production will be given with merely a few notes concerning new developments or conditions.

## GREAT BRITAIN.

The product in Great Britain continues to decline, as shown in the following table:

*Production and value of manganiferous ores in the United Kingdom from 1884 to 1897.*

| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| | *Tons.* | | | *Tons.* | |
| 1884 | 909 | $6,921 | 1891 | 9,476 | $30,071 |
| 1885 | 1,688 | 11,669 | 1892 | 6,078 | 21,461 |
| 1886 | 12,763 | 52,722 | 1893 | 1,336 | 3,688 |
| 1887 | 13,777 | 53,772 | 1894 | 1,809 | 3,582 |
| 1888 | 4,342 | 9,361 | 1895 | 1,273 | 3,323 |
| 1889 | 8,852 | 31,354 | 1896 | 1,080 | 2,983 |
| 1890 | 12,444 | 32,588 | 1897 | 599 | *a* 1,650 |

*a* Estimated.

## GERMAN EMPIRE.

During 1896 manganese mining was more active in Germany than in 1895, the Bonn district alone producing 43,614 tons.

Complete returns for 1897 are not at hand, but the production from 1890 to 1896 is given below.

*Production of manganese ores in Germany from 1890 to 1896.*

| Year. | Long tons. |
|---|---|
| 1890 | 41,180 |
| 1891 | 39,698 |
| 1892 | 32,341 |
| 1893 | 40,057 |
| 1894 | 43,012 |
| 1895 | 40,674 |
| 1896 | 44,350 |

PRUSSIA.

The production of the Prussian mines from 1881 to 1896 is shown in the table subjoined:

*Production and value of manganese ores in Prussia from 1881 to 1896.*

| Year. | Product. | Value. | Year. | Product. | Value. |
|---|---|---|---|---|---|
| | *Long tons.* | | | *Long tons.* | |
| 1881 | 10,911 | $79,104 | 1889 | 43,311 | $216,381 |
| 1882 | 4,597 | 33,745 | 1890 | 39,497 | 174,428 |
| 1883 | 4,502 | 28,423 | 1891 | 36,278 | 174,624 |
| 1884 | 7,629 | 43,118 | 1892 | 30,892 | 101,844 |
| 1885 | 14,464 | 81,302 | 1893 | 38,384 | 93,506 |
| 1886 | 24,649 | 177,066 | 1894 | 41,854 | 94,992 |
| 1887 | 35,957 | 228,439 | 1895 | 39,266 | 100,832 |
| 1888 | 26,877 | 147,250 | 1896 | 42,925 | 97,469 |

BELGIUM.

Most of the Belgium ores are more properly manganiferous iron ores, as is indicated by the valuation.

*Production of manganese ore in Belgium.*

| Year. | Product. | Value. | Year. | Product. | Value. |
|---|---|---|---|---|---|
| | *Tons.* | *Francs.* | | *Tons.* | *Francs.* |
| 1880 | 700 | 4,000 | 1889 | 20,905 | 248,000 |
| 1881 | 770 | 4,000 | 1890 | 14,255 | 176,000 |
| 1882 | 345 | 1,750 | 1891 | 18,498 | 254,600 |
| 1883 | 820 | 4,100 | 1892 | 16,775 | 208,300 |
| 1884 | 750 | 3,750 | 1893 | 16,800 | 201,000 |
| 1885 | ..... | ..... | 1894 | 22,048 | 277,700 |
| 1886 | 750 | 9,000 | 1895 | 22,478 | 286,270 |
| 1887 | 12,750 | 155,850 | 1896 | 23,265 | 345,020 |
| 1888 | 27,787 | 325,000 | | | |

## FRANCE.

France exported to the United States in 1897 8,928 tons of manganese ores, a cargo analysis of which, when dried at 212°, is given.

*Analysis of a cargo of French manganese ore.*

| | Per cent. |
|---|---|
| Peroxide of manganese | 21.72 |
| Protoxide of manganese | 29.06 |
| Peroxide of iron | 15.86 |
| Alumina | 9.07 |
| Magnesia | 4.81 |
| Lime | 5.90 |
| Silica | 9.55 |
| Baryta | 1.34 |
| Phosphorus | .05 |
| Sulphur | .29 |
| Arsenic | .06 |
| Zinc | Trace. |
| Copper | Trace. |
| Carbonic acid | .80 |
| Combined water | .41 |
| Total | 98.92 |
| Metallic manganese | 36.24 |
| Metallic iron | 11.10 |

The records as received show the following yearly output of manganese ore in France from 1886 to 1896:

*Production and value of manganese ores in France from 1886 to 1896.*

| Year. | Production. | Total value. | Value per ton. | Year. | Production. | Total value. | Value per ton. |
|---|---|---|---|---|---|---|---|
| | *Long tons.* | | | | *Long tons.* | | |
| 1886 | 7,555 | $53,099 | $7.03 | 1892 | 31,894 | $205,074 | $6.43 |
| 1887 | 11,932 | 50,501 | 4.23 | 1893 | 37,406 | 290,073 | 7.75 |
| 1888 | 10,873 | 60,757 | 5.59 | 1894 | 32,239 | 192,264 | 5.96 |
| 1889 | 9,842 | 59,000 | 5.99 | 1895 | 30,385 | 177,698 | 5.85 |
| 1890 | 15,731 | 89,517 | 5.69 | 1896 | 30,797 | 179,297 | 5.82 |
| 1891 | 15,101 | 90,316 | 5.98 | | | | |

## AUSTRIA.

Information in regard to Austrian metalliferous deposits is meager, but to the figures for the years 1876 to 1893, given by Mr. Weeks in centners of 110.23 pounds, is added the reported output for the years 1894 and 1895 in centners—equivalent to 5,056 metric tons in 1894 and 4,283 metric tons in 1895.

*Production of manganese in Austria from 1876 to 1895.*

| Year. | Product. | Year. | Product. |
|---|---|---|---|
| | *Centners.* | | *Centners.* |
| 1876 | 67,817 | 1886 | 92,464 |
| 1877 | 78,999 | 1887 | 93,108 |
| 1878 | 41,836 | 1888 | 65,541 |
| 1879 | 34,337 | 1889 | 39,261 |
| 1880 | 88,744 | 1890 | 80,068 |
| 1881 | 91,097 | 1891 | 52,793 |
| 1882 | 84,183 | 1892 | 46,000 |
| 1883 | 93,821 | 1893 | 54,000 |
| 1884 | 79,423 | 1894 | 101,120 |
| 1885 | 61,577 | 1895 | 87,040 |

## RUSSIA.

The transactions of the American Institute of Mining Engineers contain a late paper on "The manganese ore industry of the Caucasus," by Mr. Frank Drake, of New York City, which is full of interest. In this the author states that all the manganese ore now known in the market as Caucasian comes from Chiaturi. Manganese ores are known to exist in the Caucasus in a number of localities, viz, in the government of Kutais, near the village of Chiaturi; in the same government, near the Choruk River, southward from Batoum, and in the government of Erivan and Tiflis. In smaller quantities they are also found in various other places. The first-mentioned deposits are by far the most important. The others are not only less extensive but remote from present means of communication, and, from their character, expensive to work, although in some cases the ore is of superior quality. No other known deposit of manganese ore can approach that of Chiaturi in capacity for producing large quantities of high-grade ore at a low cost. The deposit is said to have been discovered in 1848, but the first shipments were made in 1879, when 871 long tons were produced. Since that time the production has steadily increased, until now the world relies on this deposit for about one-half its supply of manganese ore.

*Production.*—The total product of the mines of Chiaturi to date is estimated at 1,682,400 tons. The following table shows the productions and exports of Caucasian ore for a series of years, commencing with 1885, together with the approximate production of the world for the same period. For the year 1898 it is expected that the Caucasian product will be in the neighborhood of 300,000 tons.

*Production and exports of Caucasian manganese ore.*

| Year. | Caucasian production. | Caucasian exports. | World's production. |
|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* |
| 1885 | 58,722 | 41,396 | 140,484 |
| 1886 | 67,985 | 53,751 | 208,289 |
| 1887 | 51,890 | 59,523 | 253,677 |
| 1888 | 29,401 | 49,076 | 186,429 |
| 1889 | 68,439 | 55,489 | 258,935 |
| 1890 | 168,840 | 135,492 | 415,883 |
| 1891 | 98,670 | 84,040 | 323,614 |
| 1892 | 165,101 | 129,835 | 424,746 |
| 1893 | 166,420 | 123,228 | 388,864 |
| 1894 | 180,533 | 154,832 | 403,307 |
| 1895 | 160,277 | 171,608 | ..... |
| 1896 | ..... | 193,641 | ..... |
| 1897 | 231,868 | 201,612 | ..... |

*Location.*—Chiaturi is a village of the trans-Caucasian Russian province of Kutais, on the Kvrilli River (a tributary of the Rion, which enters the Black Sea near Poti), and is now connected by a narrow-gauge railway with the main line of the trans-Caucasian railway 25 miles to the southwest.

*Occurrence.*—The ore occurs in a bedded deposit lying almost horizontally near the tops of lofty hills in the vicinity of the village and at an altitude of 1,000 feet above the Kvrilli River. The action of the elements in forming the rugged topography observed in this region has carried away perhaps more than one-half the original deposit. The existing beds, as opened on seven of the mountains near Chiaturi, in a brown sandstone of Miocene age, has an average thickness of between 6 and 7 feet and is free from sudden or extreme variations from the average thickness.

The deposit has a distinctly stratified structure and is composed largely of pyrolusite, but other oxides of manganese also occur. In many instances strata of sandstone or of loose friable arenaceous material are intercolated with the manganese ore, varying in thickness from a small fraction of an inch to as much as 10 inches or a foot. It is quite certain that an area of more than 22 square miles of the present

surface is underlaid by ore available for mining, and on this basis it is estimated that, even if the crude and wasteful methods now pursued should be continued, the bed will yield more than 80,000,000 tons of marketable ore.

*Composition.*—In some localities, over limited areas, the materials composing the bed, without sorting or cleaning, carry 50 per cent of the metal, and the average is probably 40 to 45 per cent, while ore from which barren material has been thoroughly separated contains as much as 61 per cent. The imperfectly sorted ore that is exported generally runs from 46 to 56 per cent in manganese, the average probably being 51 and 52 per cent. With proper care no ore from Chiaturi should carry less than 51 per cent. The phosphorus in the ore as shipped at present averages about 0.16 per cent and silica not above 8 per cent. All of the figures given above refer to ore dried at 212° Fahrenheit.

The following is a complete analysis of a sample of well-assorted and cleaned ore from Chiaturi dried at 212° F.:

*Analysis of manganese ore from Chiaturi, Russia.*

| Substance. | Per cent. |
|---|---|
| Manganese peroxide | 86.25 |
| Manganese protoxide | .47 |
| Iron peroxide | .61 |
| Oxide of copper | .01 |
| Oxide of nickel | .30 |
| Alumina | 1.74 |
| Lime | 1.73 |
| Magnesia | .20 |
| Baryta | 1.54 |
| Potash and soda | .22 |
| Silica | 3.85 |
| Carbonic acid | .63 |
| Sulphur | .23 |
| Phosphoric acid (0.141 P.) | .323 |
| Combined water | 1.850 |
| Total | 99.953 |
| Metallic manganese | 54.90 |

The physical characteristics of the manganese ore of Chiaturi are unfavorable in that the proportion of large pieces obtained is small and much of the ore is quite soft, grinding to a fine powder during the handling incidental to mining, cleaning, and transportation. The loss of ore during transportation is thus larger than it otherwise would be, while the high proportion of fine ore is sometimes considered objectionable by consumers.

*Ownership.*—The ore fields at Chiaturi are owned mostly by natives, who hold parcels of ground varying in size from half an acre to 40 or 50 acres or possibly more. Some of these proprietors mine the ore from their holdings, while others lease the mining right and receive therefor a royalty varying from 10 to 50 cents per ton.

*Labor.*—The fact that there is no regular mining population in the district and that the men obtainable for operating the mines have, as a rule, some agricultural land of their own, and thus an occupation apart from the production and transportation of ore to which they return with more or less frequency, introduces an element of uncertainty into the labor supply which is a disadvantage to the industry.

*Wages.*—The wages earned at Chiaturi are about the same for all classes of labor, and average probably not more than 40 cents per day for a man, and about 70 cents for a man and horse. But small as these wages are, they seem to meet the meager requirements of the workers. The working day begins at sunrise and ends at sunset, with intermissions of various lengths for meals and rest. The actual hours of labor probably do not average the year round more than eight hours per day.

The average number of men employed in the ore industry at Chiaturi is estimated at about 2,700.

*Mining.*—Seldom can underground mining be undertaken under natural conditions so favorable as those existing at Chiaturi. The bed is of a sufficient thickness for economical breaking of the ore, the inclosing rock is so firm that very little timber is required, and the ore itself is mostly so soft that it can be advantageously mined without the use of explosives. Moreover, there is no water to contend with, nor are expensive shafts or other openings necessary to reach and mine the ore. The distinct bedding planes which characterize the material of the deposit and the weakness of adhesion along these planes result in the separation, in large part, of the pieces of ore and the gangue during the process of mining, and when this does not occur the separation afterwards by hand is rendered easy by the same characteristics.

The features mentioned above, and the additional circumstance that there is a considerable difference in specific gravity between ore and gangue, indicate that excellent results would be obtained by washing the ore mechanically. The native miners have adopted the obvious method of attacking this deposit where it is exposed or may be easily uncovered on the mountain sides. Their practice is to drift on the bed perpendicularly to the exposed face until the drift becomes so long that the expense of removing the ore from it in wheelbarrows or baskets is too great to permit further progress. Later cross drifts may be driven, leaving the roof supported by pillars, which may afterwards be "robbed" until the roof falls in; or, as is frequently the case, no cross drifts are driven, but the main drifts or parts of them are enlarged until they become extensive stopes of irregular size and shape, cave in,

and are abandoned. By these methods probably more than one-half the ore in the ground worked at Chiaturi is being lost.

It is frequently the practice to mine out the whole thickness of the bed and sort the ore outside, but in instances where thick strata of sandstone or of ore occur too poor, from admixture of gangue, to be profitably sorted by hand, it is common to break such waste material separately and stow it underground. The transportation of ore from the working face to the cleaning ground is accomplished almost entirely by the use of baskets and wheelbarrows. But in a few instances, in the longer drifts, a track of wooden rails has been laid, and a primitive mine car has been placed in operation.

The workings described generally do not extend more than 300 feet back from the face of the mountain; but in a few instances they have been carried horizontally from 400 to 500 feet. Thus only the outer edges of the ore bed are being worked.

*Sorting.*—The ore brought from the mine is dumped on the level ground at the mouth of the tunnel, and, either immediately or after it has been spread out and allowed to dry for some time, a laborer with a shovel throws it against a wire screen of about one-half inch mesh, fixed in an inclined position; the material passing through the screen is considered as waste, and undergoes no further treatment. The portion failing to pass through the screen falls in front of it, and is sorted by hand. The proportion of clean ore yielded by the crude ore of Chiaturi under this treatment varies considerably in different localities, but it is thought that it averages about one-third.

Experiments on mechanical washing indicated that by this means a general product carrying from 59 to 60 per cent of manganese may be obtained from the ore of some localities, and also that, owing to the possibility of saving much that now goes to waste, a larger proportion of clean ore would be yielded than at present. The cost of washing would be greater than that of the present hand-cleaning process, but this would be more than counterbalanced by the increased quantity and value of the product.

Mining and cleaning are generally let together by contract at a fixed rate per "cubic sagene" of clean ore. The contractors mine the ore, transport it outside, and clean it, and the operator or owner supplies timber, lights, etc. The Russian standard cubic sagene contains about 343 cubic feet, and this volume of clean broken ore would weigh about 23 tons; but at Chiaturi cubic sagenes of from 1½ to 2 times this capacity are used, so that the weight of a cubic sagene of ore varies from 34 to 46 tons. Contracts are taken by parties of two men or more, and the rate paid per cubic sagene of clean ore is from $10 to $25, according to the distance of underground tramming, proportion of waste contained in the crude ore, etc. The number of days required for one man to mine and clean a cubic sagene varies from twenty to eighty.

*Costs.*—Under these widely differing conditions it is difficult to arrive at the average cost for the labor of mining, tramming, and cleaning. For the more favorable-conditioned properties, however, it is thought that the average is about 39 cents per ton of clean ore, and that the following estimate of the total cost at the mine per ton of clean ore is a fair approximation:

*Estimated cost of mining manganese ore in Russia.*

| | Per ton of clean ore. |
|---|---|
| Labor for mining, tramming, and cleaning | $0.39 |
| Timber and other supplies | .04 |
| General expense | .16 |
| Royalty | .17 |
| Subscription to Producers' Association | .16 |
| | .92 |

The manganese ore producers all contribute to a fund which is expended, under the supervision of the officials of the Government, for objects of general utility, such as police service, building and maintaining roads, etc.

*Transportation.*—The transportation of ore from the Chiaturi mines to Poti, on the Black Sea, the principal shipping port, although a small quantity is shipped each year from Batoum, is effected in three stages, the ore being first brought down the mountains from the mines to the railway station at Chiaturi, then carried on the narrow-gauge railroad to Sharapon, and from that point taken over the main line of the trans-Caucasian railway to Poti. The distance from the village to the workings at present opened varies from 1 to 4 miles, and transportation from the mines is in large part effected over narrow trails which traverse in zigzags the precipices and steep slopes of the mountains. Some of these trails are impassable, except for the most sure-footed pack animals, while over others it is impossible to use the primitive two-wheeled ox cart, known as an "arba." The animals, as well as the carts, employed for this work are the property of the peasants engaged in it; and the latter are paid for the transportation of ore, including loading and unloading, at rates varying in good weather from 65 cents to $1.30 per ton, according to the distance from the mine to Chiaturi. In wet weather the steep mountain trails are dangerous and almost impassable, and the cost of transportation over them becomes abnormally high; at the same time the quantity it is possible to transport is greatly decreased.

The adoption of tramways for transportation from the mines to the village is perfectly feasible, and would not only reduce the cost very materially but would render it independent of the varying condition of the mountain roads. The ore received at the station is stored near the railway tracks, and is afterwards loaded on the narrow-gauge cars, 4 tons' capacity, by carrying the ore on the cars in baskets. At Sharopan

the ore train is run out on a trestle extending over a platform level with the floors of the cars of the broad-gauge road to Poti. The narrow-gauge cars are unloaded by the use of shovels, and the ore, falling on the platform below, is transferred to broad-gauge cars by shoveling and the use of baskets.

The freight charge made by the Government railway administration for transporting ore from Chiaturi to Sharopan, a distance of 25 miles, is $3.28 per ton, at the extravagant rate of 13.1 cents per ton mile. To this must be added 36 cents per ton for station expenses, weighing, and loading at Chiaturi and transferring at Sharopan, making the total expense of taking ore from storage at Chiaturi and placing it on board the broad-gauge cars $3.64 per ton. Assuming that a freight rate of 40 cents per ton for transportation from Chiaturi to Sharopan would remunerate the capital invested in the railway, it is evident that, should a formidable competitor arise, the Russian railway administration would have it in its power to reduce immediately the cost at which the ore may be delivered in foreign ports by $2.88 per ton; and a still further reduction could be effected by making the Chiaturi branch of standard gauge.

From Sharopan to the Poti railway station is 82 miles, and from the station to the pier where ore is loaded for export, 1⅛ miles. Ore is carried over the trans-Caucasian railway in covered and in open box cars, both types holding about 10 tons. Like the cars used on the narrow-gauge road, they are not provided with any arrangements to facilitate unloading, which has to be done at Poti, as at Sharopan, with shovels and baskets. Ore is frequently discharged at Poti station and kept in store there for some time, and then reloaded and taken to the pier, from which it is at once carried in baskets on board vessels waiting to receive it.

The freight from Sharopan to Poti station is 52 cents per ton, to which must be added an amount averaging about 29 cents per ton for station expenses, storage, transfer from station to pier, etc., making the total cost of transferring ore, loaded on cars at Sharopan, and placing it on the vessel at Poti, free on board, 81 cents per ton.

*Exports.*—Great Britain is the largest consumer of Caucasian ore, taking about 100,000 tons annually; then follow Germany, France, the United States, and European Russia. The ocean freights from Poti to the ports of western Europe varies from 9 shillings per ton to 15 shillings, or even more, and is influenced by the demand for grain tonnage. At present the freight to English ports is about 12½ shillings, equivalent to $3.03 per ton, to which must be added 12½ cents for insurance, sampling, checking weights, etc. Freight to America is generally about 35 cents per ton higher than to England.

A duty of 16½ cents per ton is levied on exports of manganese ore from Poti, the proceeds of which are applied to the maintenance and improvement of the port.

The total cost (neglecting moisture and loss in transit) of Caucasian ore, delivered at English ports, may be estimated about as follows:

*Cost of Caucasian manganese delivered at English ports.*

| | Per long ton. |
|---|---|
| Cost of production | $0.92 |
| Transportation to Chiaturi | .71 |
| | 1.63 |
| Loading and storage at Chiaturi and transferring at Sharopan | .36 |
| Freight from Chiaturi to Sharopan | 3.28 |
| Freight from Sharopan to Poti station | .52 |
| Unloading, storage, etc., at Poti | .29 |
| Port duty | .16½ |
| | 6.24½ |
| Ocean freight, insurance, sampling, etc | 3.15½ |
| Total | 9.40 |

Taking the price in England of Caucasian ore, delivered, as about 9½ pence per unit of metal, the percentage of the latter being determined on the basis of ore dried at 212° F., and making reduction from the gross weight for the moisture as shown by sample, a 52 per cent ore is worth $9.97 per ton, dry weight.

While prices, ocean freights, and the manganese percentages in the ores vary considerably, and the figures given above for cost of production and for some other items are only approximate, it is evident, considering that moisture and loss in transit amount to from 5 to 7 per cent, or even more, that there is little or no profit in the business. This, in fact, has been for several years past the complaint of all engaged in it. Although the deposit at Chiaturi is practically free from foreign competition, the local conditions affecting it, particularly the enormous quantity of ore it contains, its large number of proprietors, the ease with which the production of ore may be entered upon, and the lack of other sufficient occupation for the inhabitants of the region, are such as to promote overproduction and severe competition among the producers of the ore, which keep prices at a level affording to those engaged in the industry only a meager subsistence.

Messrs. Leech, Harrison & Forwood give the average analysis of Caucasian ore when dried at 212° as: Metallic manganese, 51.0 per cent; phosphorus, 0.15 per cent; silica, 7.5 to 8.5 per cent, and metallic iron, 1.0 per cent.

*Other Russian manganese ores.*—Mr. A. J. Ennis reports that Russia has an additional source of supply from the Nicopol district. The

initial shipments to this country in 1897, about 3,000 tons, were of the following composition:

*Analysis of manganese ore from the Nicopol district, Russia.*

| | Per cent. |
|---|---|
| Moisture | 7.00 |
| Metallic manganese | 46.00 |
| Metallic iron | 1.00 |
| Silica | 12.50 |
| Phosphorus | .25 |

Of the imports into the United States in 1897, 38,910 long tons of manganese ores are credited to Russia, and it is possible that some credited to Great Britain is also Russian ore.

## SPAIN.

The war with Spain has interfered with obtaining late data from that country in regard to the amount of manganese and manganiferous ores mined in Spain in 1897, but it is probable that this approximates the production of 1896, viz, 90,000 tons.

Messrs. Ennis & Co. state that the manganiferous ores obtained from Spain have the following general range in analyses:

*Composition of Spanish manganiferous ores.*

| | Per cent. |
|---|---|
| Moisture when dried | 10.50 |
| Metallic manganese | 16.5 to 18.00 |
| Metallic iron | 26.5 to 29.50 |
| Silica | 8.5 to 10.50 |
| Phosphorus | .01 to .014 |

That firm estimates the amount of this character of ore imported into the United States in 1897 as less than 10,000 long tons. The effect of conscription upon labor and the possibility of restricted shipping facilities may restrict the output of manganese in 1898.

The production of Spain is given in the annexed table:

*Production of manganese and manganiferous iron ores in Spain from 1890 to 1897.*

| Year. | Long tons. | Year. | Long tons. |
|---|---|---|---|
| 1890 | 9,716 | 1894 | 423 |
| 1891 | 6,883 | 1895 | 10,001 |
| 1892 | 16,643 | 1896 | 90,546 |
| 1893 | 1,437 | 1897 | a 90,000 |

a Estimated.

## PORTUGAL.

This country produced small amounts of manganese ores, the figures for 1895 being 1,220 long tons, valued at $8,250, and in 1896 1,470 long tons, valued at $14,678.

## ITALY.

Italy contributes some manganese ores and also some manganiferous iron ore from the deposits of these minerals, as will be seen from the following table:

*Production of manganese and manganiferous iron ores in Italy from 1887 to 1896.*

| Year. | Manganese ores. | | Manganiferous iron ores. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Long tons.* | | *Long tons.* | |
| 1887 | 4,364 | $21,872 | ..... | ..... |
| 1888 | 3,573 | 15,054 | ..... | ..... |
| 1889 | 2,168 | 9,998 | ..... | ..... |
| 1890 | 2,113 | 9,949 | ..... | ..... |
| 1891 | 2,391 | 12,467 | ..... | ..... |
| 1892 | 1,220 | 8,106 | 4,549 | $8,320 |
| 1893 | 797 | 6,320 | 8,666 | 14,439 |
| 1894 | 748 | 4,536 | 5,718 | 8,971 |
| 1895 | 1,544 | 13,634 | None. | ..... |
| 1896 | 1,860 | 19,734 | 10,000 | 19,300 |

## GREECE.

It is reported that a French company is carrying on manganese mining at Cape Vani on the Cyclades, Greece, and a similar undertaking has been started at Fourkovuni Point by a British concern. The beds have been proved to exist in parallel layers in a hill rising abruptly from the shore to a height of 400 feet. Over 15 tunnels from 100 to 400 feet long have been opened, and these, it is claimed, show from 2 feet to 6 feet of ore. The ore is intermixed with clay, from which it is easily separated.

The total amount of manganiferous iron ore produced in Greece in 1896 is reported as 404,837 metric tons, in addition to 11,150 metric tons of manganese and iron ores.

Manganese ores are also obtained from Turkey, Bosnia, and Sweden.

## AUSTRALASIA.

Manganese ore exists in Queensland, but in late years the only mining districts producing this mineral were Gladstone and Hodgkinson. In 1896 the entire output came from the Gladstone district, in which

the Spiro deposit, situated at Auckland Hill, is the principal producer. A manganese bed has also been worked near Boat Creek, and ore is reported near Calliope River, all of the above being in the Gladstone district.

According to the official report of the Under Secretary of Mines of Queensland, the manganese ore produced during the year 1896 was 300 long tons, valued at £900 ($4,392).

The following table will show the annual production of this province of Australia since 1881:

*Production and value of manganese ores in Queensland from 1881 to 1896.*

| Year. | Product. | Value. | Year. | Product. | Value. |
|---|---|---|---|---|---|
| | *Tons.* | | | *Tons.* | |
| 1881 | 87 | $1,263 | 1891 | 10 | $126 |
| 1882 | 100 | 1,694 | 1892 | ..... | ..... |
| 1883 | 20 | 290 | 1893 | ..... | ..... |
| 1884 | 55 | 799 | 1894 | 140 | 1,936 |
| 1889 | 4 | 87 | 1895 | 355 | 5,387 |
| 1890 | 5 | 97 | 1896 | 300 | 4,392 |

## SOUTH AUSTRALIA.

The manganese deposits of South Australia appear to be worked intermittently, as is indicated by the following table:

*Production and value of manganese ores in South Australia from 1882 to 1895.*

| Year. | Product. | Value. | Year. | Product. | Value. |
|---|---|---|---|---|---|
| | *Tons.* | | | *Tons.* | |
| 1882 | 136 | $3,214 | 1889 | 1,596 | $24,718 |
| 1883 | 333 | 10,062 | 1890 | 2,764 | 33,991 |
| 1884 | 59 | 1,142 | 1891 | 847 | 8,349 |
| 1885 | ..... | 4,061 | 1892 | 704 | 7,416 |
| 1886 | 1,550 | 53,163 | 1893 | 2,428 | 30,778 |
| 1887 | 1,452 | 27,801 | 1894 | 174 | 2,516 |
| 1888 | 1,021 | 16,974 | 1895 | 48 | 712 |

No late data concerning the mining of manganese ores in New South Wales and New Zealand have been received.

## ASIA.

### JAPAN.

Dr. Th. Mukai, in a late issue of Stahl und Eisen, states that considerable manganese ore occurs in Japan, and that in 1897 4,816 tons of Japanese ore was imported into the United States.

## INDIA.

*Occurrence.*—Considerable manganese ore was brought from India in 1897, being shipped from Vizagapatam, on the Madras coast. According to Mr. H. G. Turner, attention was first directed to a small deposit in the Vizagapatam district about six years ago, and further exploration brought to light the occurrence of the mineral in large quantities. The ore outcrops in various places over, so far as is known, an area of 100 square miles, situated within the extensive territories of the Maharajah of Vizianagram, stretching between the eastern Ghats Mountains and the Bay of Bengal. It is about 500 miles north of the city of Madras and about the same distance south of Calcutta. The outcrops occur in a plain country in the form of mounds, as low hills, and in isolated blocks, while in some places the soil, impregnated with black oxide of manganese, gave indications of ore beneath the surface. The first mound was discovered within a few hundred yards of the East Coast Railway, and the contractors broke up the manganese blocks for ballast, unaware of its nature or value. Investigation showed that this was but the end of a deposit of vein-like masses of ore and detached bowlders embedded in detritus of country rock, about 2½ miles in length, comprising an area of 660 acres. The detached blocks of ore exhibited marks of being water-worn, and occurred in all sizes from a pebble up to bowlders of several hundredweight.

*Characteristics.*—These broken fragments were disseminated throughout the soil, sometimes so sparsely as to make quarrying unprofitable, at other places in drifts and beds several feet thick and of value. The nodules were coated with a thin layer of oxide of iron, and when broken presented a steel-gray color. They contained 45 to 48 per cent of metallic manganese. Other nodules were angular, and when fractured showed a metallic luster. These were richer in composition than the first named, containing 48 to 50 per cent of metallic manganese. The vein-like masses had been worked to a depth of 50 feet. The ore in these veins varied considerably in manganese, in iron, and in phosphorus. Some was of steel-gray color, with 48 per cent of manganese, and associated with it was a cindery ore of 35 per cent. Another variety was porous. The occurrence of phosphorus in adjacent veins was peculiar. Two varieties presenting similar external appearance might contain, one 0.1 per cent of phosphorus and the other 0.2 per cent. Farther along the deposit ore occurred of equally variable nature, a fine character of soft pyrolusite being worked at the extreme end of the property. This ore was of good quality, yielding after selection about 80 per cent peroxide of manganese, while the impure variety yielded about 70 per cent.

There were several outcrops of manganiferous iron ore, which yielded, on an average, 41.2 per cent of manganese, 0.17 of phosphorus, and 17.9 per cent of iron.

*Shipments.*—The high-class ores went to the ferro-manganese makers, the lower class to the basic furnaces, while the pyrolusite was taken by chemical works. Recently other deposits have been discovered, notably one at a village called Garbham, about 10 miles from the deposit described above.

Messrs. Leech, Harrison & Forwood, of Liverpool, England, state that the manganese ore shipped from Vizagapatam gave in dried state 47 per cent of metallic manganese, with about 9 per cent of iron, 0.25 to 0.30 per cent of phosphorus, and silica as low as 2 per cent.

The quantity of manganese ore exported from the Madras Presidency in the year 1895–96 was 22,758 tons, of which the greater portion was sent to Great Britain and the balance to the United States. The 1894 output was 11,400 long tons and the 1895 output 15,816 long tons.

# GOLD AND SILVER.

## PRODUCTION.

The statistics collected by the Director of the Mint show that the total product of gold increased to 2,774,935 fine ounces, valued at $57,363,000, in the calendar year 1897. The product of 1896 was 2,568,132 fine ounces; value, $53,088,000.

The silver product declined from 58,834,800 fine ounces in 1896 to 53,860,000 ounces in 1897. The commercial value of this product in 1897 was $32,316,000. The decline in production was distributed among nearly all of the great silver-producing States.

The following tables show the increase and decrease in production for each State for the last three years:

*Product of gold and silver for the calendar year 1895, by States and Territories.*

| State or Territory. | Gold. | | Silver. | | Total value. |
|---|---|---|---|---|---|
| | Fine ounces. | Value. | Fine ounces. | Coining value. | |
| Alaska | 78,140 | $1,615,300 | 67,200 | $86,880 | $1,702,180 |
| Arizona | 95,072 | 1,965,300 | 986,900 | 1,275,990 | 3,241,290 |
| California | 722,171 | 14,928,600 | 653,700 | 845,180 | 15,773,780 |
| Colorado | 643,634 | 13,305,100 | 23,398,500 | 30,252,600 | 43,557,700 |
| Georgia | 6,192 | 128,000 | 400 | 520 | 128,520 |
| Idaho | 86,088 | 1,779,600 | 3,110,600 | 4,021,780 | 5,801,380 |
| Michigan | 2,075 | 42,900 | 37,300 | 48,220 | 91,120 |
| Montana | 198,405 | 4,101,400 | 17,569,100 | 22,715,600 | 26,817,000 |
| Nevada | 75,088 | 1,552,200 | 956,200 | 1,236,290 | 2,788,490 |
| New Mexico | 23,810 | 492,200 | 694,800 | 898,320 | 1,390,520 |
| North Carolina | 2,622 | 54,200 | 400 | 520 | 54,720 |
| Oregon | 42,972 | 888,300 | 51,000 | 65,930 | 954,230 |
| South Carolina | 6,212 | 128,400 | 400 | 520 | 128,920 |
| South Dakota | 187,187 | 3,869,500 | 159,300 | 205,960 | 4,075,460 |
| Texas | ..... | ..... | 450,000 | 581,810 | 581,810 |
| Utah | 66,419 | 1,373,000 | 7,468,100 | 9,655,720 | 11,028,720 |
| Washington | 16,980 | 351,000 | 122,700 | 158,640 | 509,640 |
| Alabama, Connecticut, Minnesota, Nebraska, Tennessee, Virginia, Wyoming | 1,693 | 35,000 | 400 | 520 | 35,520 |
| Total | 2,254,760 | 46,610,000 | 55,727,000 | 72,051,000 | 118,661,000 |

*Approximate distribution, by producing States and Territories, of the product of gold and silver in the United States for the calendar year 1896.*

[As estimated by the Director of the Mint.]

| State or Territory. | Gold. | | Silver. | | Total value. |
|---|---|---|---|---|---|
| | Fine ounces. | Value. | Fine ounces. | Coining value. | |
| Alabama | 275 | $5,700 | ..... | ..... | $5,700 |
| Alaska | 99,444 | 2,055,700 | 145,300 | $187,863 | 2,243,563 |
| Arizona | 125,978 | 2,604,200 | 1,913,000 | 2,473,373 | 5,077,573 |
| California | 737,036 | 15,235,900 | 600,600 | 776,533 | 16,012,433 |
| Colorado | 721,320 | 14,911,000 | 22,573,000 | 29,185,293 | 44,096,293 |
| Georgia | 7,305 | 151,000 | 600 | 776 | 151,776 |
| Idaho | 104,263 | 2,155,300 | 5,149,900 | 6,658,457 | 8,813,757 |
| Iowa | 48 | 1,000 | ..... | ..... | 1,000 |
| Maryland | 15 | 300 | ..... | ..... | 300 |
| Michigan | 1,800 | 37,200 | 59,000 | 76,283 | 113,483 |
| Minnesota | 39 | 800 | ..... | ..... | 800 |
| Montana | 209,207 | 4,324,700 | 16,737,500 | 21,640,404 | 25,965,104 |
| Nevada | 119,404 | 2,468,300 | 1,048,700 | 1,355,895 | 3,824,195 |
| New Mexico | 23,017 | 475,800 | 687,800 | 889,277 | 1,365,077 |
| North Carolina | 2,143 | 44,300 | 500 | 646 | 44,946 |
| Oregon | 60,517 | 1,251,000 | 61,100 | 78,998 | 1,329,998 |
| South Corolina | 3,062 | 63,300 | 300 | 388 | 63,688 |
| South Dakota | 240,414 | 4,969,800 | 229,500 | 296,727 | 5,266,527 |
| Tennessee | 15 | 300 | ..... | ..... | 300 |
| Texas | 387 | 8,000 | 525,400 | 679,305 | 687,305 |
| Utah | 91,908 | 1,899,900 | 8,827,600 | 11,413,463 | 13,313,363 |
| Vermont | 48 | 1,000 | ..... | ..... | 1,000 |
| Virginia | 169 | 3,500 | ..... | ..... | 3,500 |
| Washington | 19,626 | 405,700 | 274,900 | 355,426 | 761,126 |
| Wyoming | 692 | 14,300 | 100 | 129 | 14,429 |
| Total | 2,568,132 | 53,088,000 | 58,834,800 | 76,069,236 | 129,157,236 |

*Approximate distribution, by producing States and Territories, of the product of gold and silver in the United States for the calendar year 1897.*

[As estimated by the Director of the Mint.]

| State or Territory. | Gold. | | Silver. | | Total value. |
|---|---|---|---|---|---|
| | Fine ounces. | Value. | Fine ounces. | Coining value. | |
| Alabama | 358 | $7,400 | 100 | $129 | $7,529 |
| Alaska | 86,011 | 1,778,000 | 116,400 | 150,497 | 1,928,497 |
| Arizona | 140,089 | 2,895,900 | 2,239,900 | 2,896,032 | 5,791,932 |
| California | 707,160 | 14,618,300 | 474,400 | 613,366 | 15,231,666 |
| Colorado | 924,166 | 19,104,200 | 21,636,400 | 27,974,335 | 47,078,535 |
| Georgia | 7,222 | 149,300 | 600 | 776 | 150,076 |
| Idaho | 82,320 | 1,701,700 | 4,901,200 | 6,336,905 | 8,038,605 |
| Iowa | 5 | 100 | ..... | ..... | 100 |
| Maryland | 5 | 100 | ..... | ..... | 100 |
| Michigan | 3,033 | 62,700 | 60,300 | 77,964 | 140,664 |
| Minnesota | 145 | 3,000 | ..... | ..... | 3,000 |
| Montana | 211,563 | 4,373,400 | 15,667,900 | 20,257,487 | 24,630,887 |
| Nevada | 143,983 | 2,976,400 | 1,228,900 | 1,588,881 | 4,565,281 |
| New Mexico | 17,246 | 356,500 | 539,500 | 697,535 | 1,054,035 |
| North Carolina | 1,674 | 34,600 | 300 | 388 | 34,988 |
| Oregon | 65,456 | 1,353,100 | 69,000 | 89,212 | 1,442,312 |
| South Carolina | 4,097 | 84,700 | 200 | 259 | 84,959 |
| South Dakota | 275,491 | 5,694,900 | 147,600 | 190,836 | 5,885,736 |
| Tennessee | 5 | 100 | ..... | ..... | 100 |
| Texas | 358 | 7,400 | 404,700 | 523,249 | 530,649 |
| Utah | 83,500 | 1,726,100 | 6,265,600 | 8,100,978 | 9,827,078 |
| Vermont | 5 | 100 | ..... | ..... | 100 |
| Virginia | 189 | 3,900 | ..... | ..... | 3,900 |
| Washington | 20,312 | 419,900 | 106,900 | 138,214 | 558,114 |
| Wyoming | 542 | 11,200 | 100 | 129 | 11,329 |
| Total | 2,774,935 | 57,363,000 | 53,860,000 | 69,637,172 | 127,000,172 |

The total increase in the gold product is practically the same as the increase in Colorado, which showed the wonderful gain from $14,911,000 in 1896 to $19,104,200 in 1897. California, on the other hand, shows a slight decrease in the gold product. The entire product of Alaska makes but a trifling showing in the enormous total, being only slightly greater than the gold product of Utah, and less than that of Arizona, California, Colorado, Montana, Nevada, and South Dakota. In fact, the total product from Alaska is reported as slightly less than in 1896, due probably to the exodus of miners from the Alaska side of the international boundary over to the Klondike district.

Mr. E. A. Leach, superintendent of the San Francisco office of the United States Mint Bureau, estimates that the gold output of the

Klondike thus far in 1898 (August) has been about $5,000,000. The receipts at the San Francisco mint up to this date have amounted to about $1,750,000 since the first arrival a few weeks ago of this year's Yukon gold. The receipts of the Seattle assay office have been about the same. The largest single deposit at the San Francisco mint was $120,000. Mr. Leach estimates that there is about $1,000,000 more of this season's output yet to reach this country.

The following tables show the production of gold and silver in the United States for the past three years, and the total increase or decrease in each year, by States and Territories:

*Production of silver in the United States in 1895 and 1896, and the increase or decrease in 1897, by States and Territories.*

| State or Territory. | 1895. | 1896. | Increase. | Decrease. |
|---|---|---|---|---|
| | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* |
| Alaska | 67,200 | 145,300 | 78,100 | ..... |
| Arizona | 986,900 | 1,913.000 | 926,100 | ..... |
| California | 653,700 | 600,600 | ..... | 53,100 |
| Colorado | 23,398,500 | 22,573,000 | ..... | 825,500 |
| Georgia | 400 | 600 | 200 | ..... |
| Idaho | 3,110,600 | 5,149,900 | 2,039,300 | ..... |
| Michigan | 37,300 | 59,000 | 21,700 | ..... |
| Montana | 17,569,100 | 16,737,500 | ..... | 831,600 |
| Nevada | 956,200 | 1,048,700 | 92,500 | ..... |
| New Mexico | 694,800 | 687,800 | ..... | 7,000 |
| North Carolina | 400 | 500 | 100 | ..... |
| Oregon | 51,000 | 61,100 | 10,100 | ..... |
| South Carolina | 400 | 300 | ..... | 100 |
| South Dakota | 159,300 | 229,500 | 70,200 | ..... |
| Texas | 450,000 | 525,400 | 75,400 | ..... |
| Utah | 7,468,100 | 8,827,600 | 1,359,500 | ..... |
| Washington | 122,700 | 274,900 | 152,200 | ..... |
| Alabama, Connecticut, Minnesota, Nebraska, Tennessee, Virginia, Wyoming | 400 | 100 | ..... | 300 |
| Total | 55,727,000 | 58,834,800 | 3,107,800 | ..... |

*Production of silver in the United States in 1896 and 1897, and the increase or decrease in 1897, by States and Territories.*

| State or Territory. | 1896. | 1897. | Increase. | Decrease. |
|---|---|---|---|---|
| | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* |
| Alaska | 145,300 | 116,400 | ..... | 28,900 |
| Arizona | 1,913,000 | 2,239,900 | 326,900 | ..... |
| California | 600,600 | 474,400 | ..... | 126,200 |
| Colorado | 22,573,000 | 21,636,400 | ..... | 936,600 |
| Georgia | 600 | 600 | ..... | ..... |
| Idaho | 5,149,900 | 4,901,200 | ..... | 248,700 |
| Michigan | 59,000 | 60,300 | 1,300 | ..... |
| Montana | 16,737,500 | 15,667,900 | ..... | 1,069,600 |
| Nevada | 1,048,700 | 1,228,900 | 180,200 | ..... |
| New Mexico | 687,800 | 539,500 | ..... | 148,300 |
| North Carolina | 500 | 300 | ..... | 200 |
| Oregon | 61,100 | 69,000 | 7,900 | ..... |
| South Carolina | 300 | 200 | ..... | 100 |
| South Dakota | 229,500 | 147,600 | ..... | 81,900 |
| Texas | 525,400 | 404,700 | ..... | 120,700 |
| Utah | 8,827,600 | 6,265,600 | ..... | 2,562,000 |
| Washington | 274,900 | 106,900 | ..... | 168,000 |
| Alabama, Connecticut, Minnesota, Nebraska, Tennessee, Virginia, Wyoming | 100 | 200 | 100 | ..... |
| Total | 58,834,800 | 53,860,000 | ..... | 4,974,800 |

*Production of gold in the United States in 1895 and 1896, and the increase or decrease in 1896, by States and Territories.*

| State or Territory. | 1895. | 1896. | Increase. | Decrease. |
|---|---|---|---|---|
| | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* |
| Alaska | 78,140 | 99,444 | 21,304 | |
| Arizona | 95,072 | 125,978 | 30,906 | |
| California | 722,171 | 737,036 | 14,865 | |
| Colorado | 643,634 | 721,320 | 77,686 | |
| Georgia | 6,192 | 7,305 | 1,113 | |
| Idaho | 86,088 | 104,263 | 18,175 | |
| Michigan | 2,075 | 1,800 | | 275 |
| Montana | 198,405 | 209,207 | 10,802 | |
| Nevada | 75,088 | 119,404 | 44,316 | |
| New Mexico | 23,810 | 23,017 | | 793 |
| North Carolina | 2,622 | 2,143 | | 479 |
| Oregon | 42,972 | 60,517 | 17,545 | |
| South Carolina | 6,212 | 3,062 | | 3,150 |
| South Dakota | 187,187 | 240,414 | 53,227 | |
| Texas | | 387 | 387 | |
| Utah | 66,419 | 91,908 | 25,489 | |
| Washington | 16,980 | 19,626 | 2,646 | |
| Alabama, Connecticut, Iowa, Maryland, Minnesota, Nebraska, Tennessee, Vermont, Virginia, Wyoming | 1,693 | 1,301 | | 392 |
| Total | 2,254,760 | 2,568,132 | 313,372 | |

*Production of gold in the United States in 1896 and 1897, and the increase or decrease in 1897, by States and Territories.*

| State or Territory. | 1896. | 1897. | Increase. | Decrease. |
|---|---|---|---|---|
| | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* | *Fine ounces.* |
| Alaska | 99,444 | 86,011 | ..... | 13,433 |
| Arizona | 125,978 | 140,089 | 14,111 | ..... |
| California | 737,036 | 707,160 | ..... | 29,876 |
| Colorado | 721,320 | 924,166 | 202,846 | ..... |
| Georgia | 7,305 | 7,222 | ..... | 83 |
| Idaho | 104,263 | 82,320 | ..... | 21,943 |
| Michigan | 1,800 | 3,033 | 1,233 | ..... |
| Montana | 209,207 | 211,563 | 2,356 | ..... |
| Nevada | 119,404 | 143,983 | 24,579 | ..... |
| New Mexico | 23,017 | 17,246 | ..... | 5,771 |
| North Carolina | 2,143 | 1,674 | ..... | 469 |
| Oregon | 60,517 | 65,456 | 4,939 | ..... |
| South Carolina | 3,062 | 4,097 | 1,035 | ..... |
| South Dakota | 240,414 | 275,491 | 35,077 | ..... |
| Texas | 387 | 358 | ..... | 29 |
| Utah | 91,908 | 83,500 | ..... | 8,408 |
| Washington | 19,626 | 20,312 | 686 | ..... |
| Alabama, Connecticut, Iowa, Maryland, Minnesota, Nebraska, Tennessee, Vermont, Virginia, Wyoming | 1,301 | 1,254 | ..... | 47 |
| Total | 2,568,132 | 2,774,935 | 206,803 | ..... |

*Product of gold and silver in the United States from 1792.*

[The estimate for 1792 to 1873 is by Dr. R. W. Raymond, United States Mining Commissioner, and since by the Director of the Mint.]

| Year. | Total. | Gold. | Silver. |
|---|---|---|---|
| April 2, 1792, to July 31, 1834 | $14,000,000 | $14,000,000 | (a) |
| July 31, 1834, to Dec. 31, 1844 | 7,750,000 | 7,500,000 | $250,000 |
| 1845 | 1,058,327 | 1,008,327 | 50,000 |
| 1846 | 1,189,357 | 1,139,357 | 50,000 |
| 1847 | 939,085 | 889,085 | 50,000 |
| 1848 | 10,050,000 | 10,000,000 | 50,000 |
| 1849 | 40,050,000 | 40,000,000 | 50,000 |
| 1850 | 50,050,000 | 50,000,000 | 50,000 |
| 1851 | 55,050,000 | 55,000,000 | 50,000 |
| 1852 | 60,050,000 | 60,000,000 | 50,000 |
| 1853 | 65,050,000 | 65,000,000 | 50,000 |
| 1854 | 60,050,000 | 60,000,000 | 50,000 |
| 1855 | 55,050,000 | 55,000,000 | 50,000 |
| 1856 | 55,050,000 | 55,000,000 | 50,000 |
| 1857 | 55,050,000 | 55,000,000 | 50,000 |
| 1858 | 50,500,000 | 50,000,000 | 500,000 |
| 1859 | 50,100,000 | 50,000,000 | 100,000 |
| 1860 | 46,150,000 | 46,000,000 | 150,000 |
| 1861 | 45,000,000 | 43,000,000 | 2,000,000 |
| 1862 | 43,700,000 | 39,200,000 | 4,500,000 |
| 1863 | 48,500,000 | 40,000,000 | 8,500,000 |
| 1864 | 57,100,000 | 46,100,000 | 11,000,000 |
| 1865 | 64,475,000 | 53,225,000 | 11,250,000 |
| 1866 | 63,500,000 | 53,500,000 | 10,000,000 |
| 1867 | 65,225,000 | 51,725,000 | 13,500,000 |
| 1868 | 60,000,000 | 48,000,000 | 12,000,000 |
| 1869 | 61,500,000 | 49,500,000 | 12,000,000 |
| 1870 | 66,000,000 | 50,000,000 | 16,000,000 |
| 1871 | 66,500,000 | 43,500,000 | 23,000,000 |
| 1872 | 64,750,000 | 36,000,000 | 28,750,000 |
| 1873 | 71,750,000 | 36,000,000 | 35,750,000 |
| 1874 | 70,800,000 | 33,500,000 | 37,300,000 |
| 1875 | 65,100,000 | 33,400,000 | 31,700,000 |
| 1876 | 78,700,000 | 39,900,000 | 38,800,000 |
| 1877 | 86,700,000 | 46,900,000 | 39,800,000 |
| 1878 | 96,400,000 | 51,200,000 | 45,200,000 |
| 1879 | 79,700,000 | 38,900,000 | 40,800,000 |
| 1880 | 75,200,000 | 36,000,000 | 39,200,000 |
| 1881 | 77,700,000 | 34,700,000 | 43,000,000 |
| 1882 | 79,300,000 | 32,500,000 | 46,800,000 |

a Insignificant.

*Product of gold and silver in the United States from 1792*—Continued.

| Year. | Total. | Gold. | Silver. |
|---|---|---|---|
| 1883 | $76,200,000 | $30,000,000 | $46,200,000 |
| 1884 | 79,600,000 | 30,800,000 | 48,800,000 |
| 1885 | 83,400,000 | 31,800,000 | 51,600,000 |
| 1886 | 86,000,000 | 35,000,000 | 51,000,000 |
| 1887 | 86,350,000 | 33,000,000 | 53,350,000 |
| 1888 | 92,370,000 | 33,175,000 | 59,195,000 |
| 1889 mint | 97,446,000 | 32,800,000 | 64,646,000 |
| 1889 census | 99,282,866 | 32,886,180 | 66,396,686 |
| 1890 | 103,330,714 | 32,845,000 | 70,485,714 |
| 1891 | 108,591,565 | 33,175,000 | 75,416,565 |
| 1892 | 115,101,000 | 33,000,000 | 82,101,000 |
| 1893 | 113,531,000 | 35,955,000 | 77,576,000 |
| 1894 | 103,500,000 | 39,500,000 | 64,000,000 |
| 1895 | 118,661,000 | 46,610,000 | 72,051,000 |
| 1896 | 129,157,236 | 53,088,000 | 76,069,236 |
| 1897 | 127,000,172 | 57,363,000 | 69,637,172 |

# COPPER.

By CHARLES KIRCHHOFF.

## GENERAL TRADE CONDITIONS.

The year 1897 was a very satisfactory one for the producing interests of the United States, and brought continuous work at undisturbed wages to the men engaged in mining, smelting, and allied industries. There was a moderate increase in the production, with an export to foreign countries equal to that of the year 1896, which was phenomenal in this respect. The home consumption took care of the larger surplus, having been stimulated by the same general causes which led to the marked expansion of our iron and steel industry in that year. In common with all the metal industries, copper mining entered 1898 with a demand unprecedented in our history, aided like the others by growing requirements from foreign countries.

There is clear evidence that, in response to the temptations held out by years of prosperity, the copper-mining industry of the United States is entering upon a period of steady expansion. Long-established and successful corporations are in many cases perfecting and adding to facilities and equipment for an increased output. Very promising developments have been made in Lake Superior, although the long preparations necessary and the heavy outlays of capital required make the accession of new mines to the list of producers relatively slow. Arizona promises to be the first to expand materially its output, and a number of smaller undertakings are shaping in different parts of the Rocky Mountain region. As an offset, there is a growing feeling among those who closely watch developments that many circumstances may conspire to keep Montana close to the maximum attained in recent years.

## PRODUCTION.

The following table shows the production of copper in the United States from its first rise to the dignity of an industry. For the earlier years the best available sources have been drawn upon for the estimates given. Since 1882 the figures are those collected by this office:

*Production of copper in the United States from 1845 to 1897.*

[Long tons.]

| Year. | Total production. | Lake Superior. | Calumet and Hecla. | Percentage of Lake Superior of total product. |
|---|---|---|---|---|
| 1845 | 100 | 12 | ..... | 12 |
| 1846 | 150 | 26 | ..... | 17.3 |
| 1847 | 300 | 213 | ..... | 71 |
| 1848 | 500 | 461 | ..... | 92.2 |
| 1849 | 700 | 672 | ..... | 96 |
| 1850 | 650 | 572 | ..... | 88 |
| 1851 | 900 | 779 | ..... | 86.6 |
| 1852 | 1,100 | 792 | ..... | 72 |
| 1853 | 2,000 | 1,297 | ..... | 64.9 |
| 1854 | 2,250 | 1,819 | ..... | 80.8 |
| 1855 | 3,000 | 2,593 | ..... | 86.4 |
| 1856 | 4,000 | 3,666 | ..... | 91.7 |
| 1857 | 4,800 | 4,255 | ..... | 88.6 |
| 1858 | 5,500 | 4,088 | ..... | 74.3 |
| 1859 | 6,300 | 3,985 | ..... | 63.3 |
| 1860 | 7,200 | 5,388 | ..... | 74.8 |
| 1861 | 7,500 | 6,713 | ..... | 89.5 |
| 1862 | 9,000 | 6,065 | ..... | 67.4 |
| 1863 | 8,500 | 5,797 | ..... | 68.2 |
| 1864 | 8,000 | 5,576 | ..... | 69.7 |
| 1865 | 8,500 | 6,410 | ..... | 75.4 |
| 1866 | 8,900 | 6,138 | ..... | 69 |
| 1867 | 10,000 | 7,824 | 603 | 78.2 |
| 1868 | 11,600 | 9,346 | 2,276 | 80.6 |
| 1869 | 12,500 | 11,886 | 5,497 | 95.1 |
| 1870 | 12,600 | 10,992 | 6,277 | 87.2 |
| 1871 | 13,000 | 11,942 | 7,242 | 91.9 |
| 1872 | 12,500 | 10,961 | 7,215 | 87.7 |
| 1873 | 15,500 | 13,433 | 8,414 | 86.7 |
| 1874 | 17,500 | 15,327 | 8,984 | 87.6 |
| 1875 | 18,000 | 16,089 | 9,586 | 89.4 |
| 1876 | 19,000 | 17,085 | 9,683 | 89.9 |

*Production of copper in the United States from 1845 to 1897*—Continued.

[Long tons.]

| Year. | Total production. | Lake Superior. | Calumet and Hecla. | Percentage of Lake Superior of total product. |
|---|---|---|---|---|
| 1877 | 21,000 | 17,422 | 10,075 | 83 |
| 1878 | 21,500 | 17,719 | 11,272 | 82.4 |
| 1879 | 23,000 | 19,129 | 11,728 | 83.2 |
| 1880 | 27,000 | 22,204 | 14,140 | 82.2 |
| 1881 | 32,000 | 24,363 | 14,000 | 76.1 |
| 1882 | 40,467 | 25,439 | 14,309 | 62.9 |
| 1883 | 51,574 | 26,653 | 14,788 | 51.6 |
| 1884 | 64,708 | 30,961 | 18,069 | 47.8 |
| 1885 | 74,052 | 32,209 | 21,093 | 43.5 |
| 1886 | 70,430 | 36,124 | 22,553 | 51.3 |
| 1887 | 81,017 | 33,941 | 20,543 | 41.9 |
| 1888 | 101,054 | 38,604 | 22,453 | 38.2 |
| 1889 | 101,239 | 39,364 | 21,727 | 38.7 |
| 1890 | 115,966 | 45,273 | 26,727 | 38.9 |
| 1891 | 126,839 | 50,992 | ..... | 40.2 |
| 1892 | 154,018 | 54,999 | ..... | 35.7 |
| 1893 | 147,033 | 50,270 | ..... | 34.2 |
| 1894 | 158,120 | 51,031 | ..... | 32.3 |
| 1895 | 169,917 | 57,737 | 34,455 | 34 |
| 1896 | 205,384 | 64,073 | 40,338 | 31.2 |
| 1897 | 220,571 | 64,858 | 39,455 | 29.4 |

In detail, the production of copper, territorially distributed, has been as follows since 1883:

*Total copper production in the United States, 1883 to 1887.*

| Source. | 1883. | 1884. | 1885. |
|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* |
| Lake Superior | 59,702,404 | 69,353,202 | 72,147,889 |
| Arizona | 23,874,963 | 26,734,345 | 22,706,366 |
| Montana | 24,664,346 | 43,093,054 | 67,797,864 |
| New Mexico | 823,511 | 59,450 | 79,839 |
| California | 1,600,862 | 876,166 | 469,028 |
| Utah | 341,885 | 265,526 | 126,199 |
| Colorado | 1,152,652 | 2,013,125 | 1,146,460 |
| Wyoming | 962,468 | ..... | ..... |
| Nevada | 288,077 | 100,000 | 8,871 |
| Idaho | ..... | 46,667 | 40,381 |
| Missouri | 260,306 | 230,000 | ..... |
| Maine and New Hampshire | 212,124 | 249,018 | 211,602 |
| Vermont | 400,000 | 655,405 | |
| Southern States | 395,175 | 317,711 | 40,199 |
| Middle States | 64,400 | 2,114 | 190,641 |
| Lead desilverizers, etc | 782,880 | 950,870 | 910,144 |
| Total domestic copper | 115,526,053 | 144,946,653 | 165,875,483 |
| From imported pyrites and ores | 1,625,742 | 2,858,754 | 5,086,841 |
| Total (including copper from imported pyrites) | 117,151,795 | 147,805,407 | 170,962,324 |

| Source. | 1886. | 1887. |
|---|---|---|
| | *Pounds.* | *Pounds.* |
| Lake Superior | 80,918,460 | 76,028,697 |
| Arizona | 15,657,035 | 17,720,462 |
| Montana | 57,611,621 | 78,699,677 |
| New Mexico | 558,385 | 283,664 |
| California | 430,210 | 1,600,000 |
| Utah | 500,000 | 2,500,000 |
| Colorado | 409,306 | 2,012,027 |
| Wyoming | ..... | ..... |
| Nevada | 50,000 | ..... |
| Idaho | ..... | ..... |
| Missouri | ..... | ..... |
| Maine and New Hampshire | 315,719 | 200,000 |
| Vermont | | |
| Southern States | 29,811 | ..... |

*Total copper production in the United States, 1883 to 1887*—Continued.

| Source. | 1886. | 1887. |
|---|---|---|
| | *Pounds.* | *Pounds.* |
| Middle States | ..... | ..... |
| Lead desilverizers, etc | 1,282,496 | 2,432,804 |
| Total domestic copper | 157,763,043 | 181,477,331 |
| From imported pyrites and ores | 4,500,000 | 3,750,000 |
| Total (including copper from imported pyrites) | 162,263,043 | 185,227,331 |

Since 1888 the production has been as follows, in detail:

*Total copper production in the United States, 1888 to 1897.*

| Source. | 1888. | 1889. | 1890. |
|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* |
| Lake Superior | 86,472,034 | 88,175,675 | 101,410,277 |
| Arizona | 31,797,300 | 31,586,185 | 34,796,689 |
| Montana | 97,897,968 | 98,222,444 | 112,980,896 |
| New Mexico | 1,631,271 | 3,686,137 | 850,034 |
| California | 1,570,021 | 151,505 | 23,347 |
| Utah | 2,131,047 | 65,467 | 1,006,636 |
| Colorado, including copper smelters (*a*) | 1,621,100 | 1,170,053 | 3,585,691 |
| Wyoming | 232,819 | 100,000 | ..... |
| Nevada | 50,000 | 26,420 | ..... |
| Idaho | 50,000 | 156,490 | 87,243 |
| Washington | ..... | ..... | ..... |
| Maine and New Hampshire | 271,631 | 72,000 | |
| Vermont | | | |
| Southern States | 18,201 | 18,144 | 378,840 |
| Middle States | ..... | ..... | |
| Lead desilverizers, etc. (*b*) | 2,618,074 | 3,345,442 | 4,643,439 |
| Total domestic copper | 226,361,466 | 226,775,962 | 259,763,092 |
| From imported pyrites and ores | 4,909,156 | 5,190,252 | 6,017,041 |
| Total (including copper from imported pyrites) | 231,270,622 | 231,966,214 | 265,780,133 |

*Total copper production in the United States, 1888 to 1897*—Continued.

| Source. | 1891. | 1892. | 1893. |
|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* |
| Lake Superior | 114,222,709 | 123,198,460 | 112,605,078 |
| Arizona | 39,873,279 | 38,436,099 | 43,902,824 |
| Montana | 112,063,320 | 163,206,128 | 155,209,133 |
| New Mexico | 1,233,197 | 1,188,796 | 280,742 |
| California | 3,397,405 | 2,980,944 | 239,682 |
| Utah | 1,562,098 | 2,209,428 | 1,135,330 |
| Colorado, including copper smelters (*a*) | 6,336,878 | 7,593,674 | 7,695,826 |
| Wyoming | ..... | ..... | ..... |
| Nevada | ..... | ..... | 20,000 |
| Idaho | 146,825 | 226,000 | 36,367 |
| Washington | ..... | ..... | 39,785 |
| Maine and New Hampshire, Vermont, Southern States, Middle States | 296,463 | 467,448 | 732,793 |
| Lead desilverizers, etc. (*b*) | 4,989,590 | 5,491,702 | 7,456,838 |
| Total domestic copper | 284,121,764 | 344,998,679 | 329,354,398 |
| From imported pyrites and ores and regulus | 11,690,312 | 7,973,065 | 10,431,574 |
| Total (including copper from imported pyrites) | 295,812,076 | 352,971,744 | 339,785,972 |

*a* Copper smelters in Colorado, purchasing argentiferous copper ores and mattes in the open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.

*b* For 1894 the quantity stated covers only that part of the incidental copper product the source of which could not be ascertained.

*Total copper production in the United States, 1888 to 1897*—Continued.

| Source. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Lake Superior | 114,308,870 | 129,330,749 | 143,524,069 | 145,282,059 |
| Arizona | 44,514,894 | 47,953,553 | 72,934,927 | 81,530,735 |
| Montana | 183,072,756 | 190,172,150 | 221,918,179 | 230,288,141 |
| New Mexico | 31,884 | 143,719 | 2,701,664 | 701,892 |
| California | 120,000 | 218,332 | 690,237 | 11,987,772 |
| Utah | 1,147,570 | 2,184,708 | 3,502,012 | 3,919,010 |
| Colorado, including copper smelters (*a*) | 6,481,413 | 6,079,243 | 6,022,176 | 11,873,033 |
| Wyoming | ..... | ..... | ..... | ..... |
| Nevada | ..... | ..... | ..... | ..... |
| Idaho | ..... | 1,425,914 | ..... | 183,277 |
| South Dakota | ..... | ..... | ..... | 2,440,338 |
| Maine and New Hampshire, Vermont, Tennessee and Southern States, Middle States | 2,374,514 | 3,105,036 | 4,704,993 | 4,472,017 |
| Lead desilverizers, etc (*b*) | 2,136,473 | ..... | 4,063,173 | 1,400,000 |
| Total domestic copper | 354,188,374 | 380,613,404 | 460,061,430 | 494,078,274 |
| From imported pyrites and ores and regulus | 10,678,434 | *c* 5,300,000 | *c* 5,900,000 | *c* 12,000,000 |
| Total (including copper from imported pyrites) | 364,866,808 | 385,913,404 | 465,961,430 | 506,078,274 |

*a* Copper smelters in Colorado, purchasing argentiferous copper ores and mattes in the open market, sources not known. The quantity of Montana matte which goes to one of these works has been deducted.

*b* For 1894 and 1896 the quantity stated covers only that part of the incidental copper product the source of which could not be ascertained.

*c* Estimated.

The available supply for the domestic markets may be computed as follows:

*Supply of copper for the United States, 1891 to 1897.*

| Source. | 1891. | 1892. | 1893. |
|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* |
| Production of domestic copper | 284,121,764 | 344,998,679 | 329,354,398 |
| Imports: | | | |
| Fine copper in ore, entered for consumption | 8,931,554 | 7,669,978 | 7,256,015 |
| Fine copper in regulus, entered for consumption | 2,403,919 | 303,087 | 3,175,559 |
| Bars and ingots | 2,556 | 22,097 | 554,348 |
| Old copper | 134,407 | 71,485 | 59,375 |
| Total | 295,594,200 | 353,065,326 | 340,399,695 |
| Exports: | | | |
| Ingots and bars | 69,279,024 | 30,515,736 | 138,984,128 |
| Estimated fine copper contents of matte | 50,000,000 | 66,000,000 | 50,000,000 |
| Total | 119,279,024 | 96,515,736 | 188,984,128 |
| Available supply | 176,315,176 | 256,549,590 | 151,415,567 |

| Source. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Production of domestic copper | 354,188,374 | 380,613,404 | 460,061,430 | 494,078,274 |
| Imports: | | | | |
| Fine copper in ore, entered for consumption | 4,804,614 | | | |
| Fine copper in regulus, entered for consumption | 5,873,820 | a5,300,000 | a5,900,000 | a12,000,000 |
| Bars and ingots | 606,415 | 7,979,322 | 9,074,379 | 16,923,098 |
| Old copper | 160,592 | 1,336,901 | 2,422,554 | |
| Total | 365,633,815 | 395,229,627 | 477,458,363 | 523,001,372 |
| Exports: | | | | |
| Ingots and bars | 162,393,000 | 121,328,390 | 258,473,285 | 277,255,742 |
| Estimated fine copper contents of matte | 5,750,000 | 15,200,000 | 22,881,936 | 11,000,000 |
| Total | 168,143,000 | 136,528,390 | 281,355,221 | 288,255,742 |
| Available supply | 197,490,815 | 258,701,237 | 196,103,142 | 234,745,630 |

*a* Estimated.

This statement leaves out of account the stocks concerning which no reliable data are obtainable. For the years 1895, 1896, and 1897 the imports of ore and regulus are gross weight, and not fine copper contents. The latter must be estimated.

Since July, 1892, Mr. John Stanton, of New York, has collected monthly, from sworn returns, the following figures showing the production of the leading mines of Lake Superior, Montana, and Arizona. The estimate of outside sources is drawn, particularly recently, from official returns of the principal smaller mines.

*American product of copper.*

[Long tons.]

| Year. | Reporting mines. | Outside sources. | Total. |
|---|---|---|---|
| Second six months of 1892 | 59,239 | 6,287 | 65,526 |
| 1893 | 129,760 | 12,730 | 142,490 |
| 1894 | 142,543 | 17,080 | 159,623 |
| 1895 | 155,497 | 15,700 | 171,197 |
| 1896 | 189,494 | 14,400 | 203,894 |
| 1897 | 204,206 | 11,900 | 216,106 |

The monthly reports, in detail, for the years 1892, 1893, and 1894 are published in Mineral Resources for 1895, and for the years 1895 and 1896 in Mineral Resources for 1896. For 1897 and for the earlier months of 1898 the monthly production was as follows:

*American product of copper, monthly, 1897 and a part of 1898.*

[Long tons.]

| Year and month. | Reporting mines. | Outside sources. | Total. |
|---|---|---|---|
| 1897. | | | |
| January | 16,937 | 700 | 17,637 |
| February | 16,119 | 700 | 16,819 |
| March | 17,583 | 700 | 18,283 |
| April | 16,554 | 900 | 17,454 |
| May | 17,805 | 1,000 | 18,805 |
| June | 18,653 | 1,000 | 19,653 |
| July | 14,244 | 1,100 | 15,344 |
| August | 16,309 | 1,100 | 17,409 |
| September | 16,343 | 1,100 | 17,445 |
| October | 16,341 | 1,200 | 17,541 |
| November | 16,227 | 1,200 | 17,427 |
| December | 21,091 | 1,200 | 22,291 |
| Total | 204,206 | 11,900 | 216,106 |

*American product of copper, monthly, 1897 and a part of 1898*—Continued.

[Long tons.]

| Year and month. | Reporting mines. | Outside sources. | Total. |
|---|---|---|---|
| 1898. | | | |
| January | 16,544 | 1,200 | 17,744 |
| February | 16,072 | 1,250 | 17,322 |
| March | 19,131 | 1,250 | 20,381 |
| April | 21,609 | 1,300 | 22,909 |
| May | 21,391 | 1,350 | 22,741 |
| June | 17,940 | 1,450 | 19,390 |
| July | 14,452 | 1,600 | 16,052 |

A considerable number of foreign mines, including those of the Peninsula, the Cape, Australia, Germany, and Mexico, report monthly to a secretary in London since July, 1892. During the last six months of 1892, and in 1893, 1894, 1895, 1896, and 1897 the product of this group, which retains friendly relations with the American Producers' Association, has been as follows:

*Foreign reporting mines.*

| Year. | Quantity. |
|---|---|
| | *Long tons.* |
| Second half 1882 | 39,655 |
| 1893 | 81,785 |
| 1894 | 88,531 |
| 1895 | 86,178 |
| 1896 | 86,196 |
| 1897 | 88,270 |

According to the careful compilations of Mr. John Stanton the exports of fine copper during recent years have been as follows:

*Exports of fine copper from the United States.*

| Year. | Quantity. |
|---|---|
| | *Long tons.* |
| 1893 | 80,392 |
| 1894 | 77,527 |
| 1895 | 64,722 |
| 1896 | 125,605 |
| 1897 | 129,210 |
| 1898 (first half) | 68,284 |

## LAKE SUPERIOR MINES.

The following is, in detail, the output of the Lake Superior mines, as reported by the companies, from 1884 to 1891:

*Production of Lake Superior copper mines, 1884 to 1891.*

| Mine. | 1884. | 1885. | 1886. | 1887. |
|---|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Calumet and Hecla | 40,473,585 | 47,247,990 | 50,518,222 | 46,016,123 |
| Quincy | 5,650,436 | 5,848,530 | 5,888,511 | 5,603,691 |
| Osceola | 4,247,630 | 1,945,208 | 3,560,786 | 3,574,972 |
| Franklin | 3,748,652 | 4,007,105 | 4,264,297 | 3,915,838 |
| Allouez | 1,928,174 | 2,170,476 | 1,725,463 | 885,010 |
| Atlantic | 3,163,585 | 3,582,633 | 3,503,670 | 3,641,865 |
| Pewabic | 227,834 | ..... | ..... | ..... |
| Central | 1,446,747 | 2,157,408 | 2,512,886 | 2,199,133 |
| Grand Portage | 255,860 | ..... | ..... | ..... |
| Conglomerate | 1,198,691 | ..... | ..... | ..... |
| Mass | 481,396 | 363,500 | 247,179 | ..... |
| Copper Falls | 891,168 | 1,150,538 | 1,378,679 | 719,150 |
| Phœnix | 631,004 | 344,355 | 1,101,804 | 11,000 |
| Hancock | 562,636 | 203,037 | 150,000 | ..... |
| Huron | 1,927,660 | 2,271,163 | 1,992,695 | 1,881,760 |
| Ridge | 74,030 | 63,390 | 158,272 | 84,902 |
| St. Clair | 139,407 | ..... | ..... | ..... |
| Cliff | 28,225 | ..... | 22,342 | ..... |
| Wolverine | 751,763 | 328,610 | 3,125 | 2,300 |
| Nonesuch | 23,867 | 28,484 | ..... | ..... |
| Isle Royale | 16,074 | ..... | ..... | ..... |
| National | 87,368 | 162,252 | 184,706 | 25,187 |
| Minnesota | 1,144 | 12,608 | ..... | ..... |
| Belt | 130,851 | 27,433 | 7,300 | ..... |
| Sheldon and Columbia | 9,828 | ..... | ..... | ..... |
| Adventure | 4,333 | 4,000 | 1,000 | ..... |
| Peninsula | 1,225,981 | ..... | ..... | ..... |
| Tamarack | ..... | 181,669 | 3,646,517 | 7,396,529 |
| Ogima | 1,106 | 12,000 | ..... | ..... |
| Kearsarge | ..... | ..... | ..... | 21,237 |
| Evergreen Bluff | 954 | 1,500 | 1,000 | ..... |
| Ash Bed | 1,517 | ..... | ..... | ..... |
| Sundry companies—tributers | 21,696 | 34,000 | 50,000 | 50,000 |
| Total | 69,353,202 | 72,147,889 | 80,918,460 | 76,028,697 |

*Production of Lake Superior copper mines, 1884 to 1891*—Continued.

| Mine. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Calumet and Hecla | 50,295,720 | 48,668,296 | 59,868,106 | ..... |
| Quincy | 6,367,809 | 6,405,686 | 8,064,253 | 10,542,519 |
| Osceola | 4,134,320 | 4,534,127 | 5,294,792 | 6,543,358 |
| Franklin | 3,655,751 | 4,346,062 | 5,638,112 | 4,319,840 |
| Allouez | 314,198 | 1,762,816 | 1,407,828 | 1,241,423 |
| Atlantic | 6,974,877 | 3,698,837 | 3,619,972 | 3,653,671 |
| Central | 1,817,023 | 1,270,592 | 1,413,391 | 1,237,500 |
| Mass | ..... | 58,349 | 62,187 | ..... |
| Copper Falls | 1,199,950 | 1,440,000 | 1,330,000 | 1,427,000 |
| Huron | 2,370,857 | 2,219,473 | 1,736,777 | 1,257,059 |
| Ridge | 50,924 | 28,000 | 21,569 | ..... |
| National | ..... | 454,134 | 123,879 | ..... |
| Adventure | ..... | 692 | 15,485 | ..... |
| Peninsula | ..... | 736,507 | 1,108,660 | 1,599,670 |
| Tamarack | 11,411,325 | 10,605,451 | 10,106,741 | 16,161,312 |
| Kearsarge | 829,185 | 1,918,849 | 1,598,525 | 1,727,390 |
| Evergreen Bluff | ..... | 21,580 | ..... | ..... |
| Sundry companies—tributers | 50,000 | 6,224 | ..... | ..... |
| Total | 86,472,034 | 88,175,675 | 101,410,277 | ..... |

The following table records only the output of some of the leading producers in that district:

*Production of Lake Superior copper mines in 1892, 1893, 1894, 1895, 1896, and 1897.*

| Mine. | 1892. | 1893. | 1894. |
|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* |
| Tamarack | 16,426,633 | 15,085,113 | 15,375,281 |
| Quincy | 11,103,926 | 14,398,477 | 15,484,014 |
| Osceola | 7,098,656 | 6,715,870 | 6,918,502 |
| Franklin | 3,769,605 | 3,504,244 | 3,556,487 |
| Atlantic | 3,703,875 | 4,221,933 | 4,437,609 |
| Kearsarge | 1,467,758 | 1,627,030 | 1,998,710 |
| Tamarack, Junior | 796,769 | 1,610,259 | 2,349,329 |
| Peninsula | 973,217 | ..... | ..... |
| Copper Falls | 1,350,000 | 750,000 | ..... |
| Huron | 461,499 | 562,776 | ..... |
| Allouez | 546,530 | ..... | ..... |
| Central | 1,625,982 | 1,180,040 | 584,590 |
| Centennial | 106,801 | ..... | ..... |
| Wolverine | 500,074 | 1,025,062 | 1,665,255 |

*Production of Lake Superior copper mines in 1892, etc.*—Continued.

| Mine. | 1895. | 1896. | 1897. |
|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* |
| Tamarack | 14,840,000 | 16,095,000 | 19,300,000 |
| Quincy | 16,304,721 | 16,863,477 | 16,924,618 |
| Osceola | 6,270,373 | 6,251,304 | 6,620,000 |
| Franklin | 3,086,933 | 2,746,076 | 2,908,284 |
| Atlantic | 4,832,497 | 4,895,985 | 5,109,663 |
| Kearsarge | 1,946,163 | 1,377,226 | 1,305,000 |
| Tamarack, Junior | 2,605,000 | 2,135,000 | 1,655,000 |
| Peninsula | | | |
| Copper Falls | | | |
| Huron | | | |
| Allouez | | | |
| Central | 379,020 | 469,243 | 611,172 |
| Centennial | | | |
| Wolverine | 1,815,391 | 2,220,933 | 2,316,296 |

The annual report of the Calumet and Hecla Mining Company for the fiscal year ending April 30, 1898, shows that the product for the fiscal year was 90,388,346 pounds of copper, against 92,475,595 pounds for the fiscal year 1896–97, 85,552,756 pounds in 1895–96, and 62,466,044 pounds in 1894–95. The dividends for the fiscal year were $4,000,000, as compared with $3,000,000 in 1896–97. The annual report of the president, Mr. Alexander Agassiz, says:

During the past fiscal year we produced mineral equal to 41,961 tons of refined copper; our product in refined copper was 45,194 tons. For the previous year our refined copper product was 46,238 tons. The price of copper has varied from 11 to 12 cents per pound. It is now 11¼ cents.

During the past fiscal year there have been paid four dividends of $10 each. It should be stated to the stockholders that the gradual increase of our surplus since 1890 and the larger dividends paid during the past two years, while due in part to the higher price of copper, have been due mainly to the gradual increase of our working force. This is now about twice what it was in 1890. We are increasing the product of the mine, and obtaining about the same profit per pound of copper as with a smaller output.

The number of men engaged in pushing our openings has continued large, and our reserves have materially increased during the past year. The amount of dead work carried on in unproductive parts of the mine is large, and must of necessity remain so. The shafts Nos. 13, 14, and 15, sinking on the Osceola amygdaloid, have been equipped with small hoisting engines. They have now reached a depth of over 400 feet, and Nos. 13 and 15 have developed some promising ground. At the south end of the mine the sinking of No. 12 has been continued, but there has been no improvement in the character of the conglomerate lode. At the north end the quality of the rock in some of the openings is not up to the general average. The Superior compressor plant is ready to be connected with the general compressed-air system. We have planned to erect at No. 5 Calumet shaft an independent hoisting plant, and to use the engines designed for No. 5 to hoist from No. 4 Calumet to relieve the Superior drums, which are now taxed to their capacity.

The delays incident to the completion of the larger hoisting engines at the Red Jacket shaft have been greater than we anticipated. We have only been able thus far to use the sinking engines. This has greatly interfered with our openings in the vicinity of Red Jacket shaft.

The public library for the use of our employees has been completed, and we hope to open it to the public during the summer. The library will be placed under control of the library board of the Calumet Township school board. We have also erected for the use of the township high school a commodious building, two floors of which will be equipped as a manual training school, and put into commission in the fall. We have erected 24 houses for the workmen and 4 for the officers. The hospital building has been entirely remodeled, and is now a commodious building, well adapted to its purposes and ample for the uses of the mine.

To avoid the delays due to the crossing of the Mineral Range Railroad with our railroad line to Torch Lake, and in accordance with an agreement entered into with us, the Mineral Range Railroad Company has abandoned the old tracks on our land east of the mine works, and transferred the business of the railroad to the west side of Red Jacket village, a more central position, and with better terminal facilities. We have occupied the abandoned roadbed and built two connecting belt lines, which will in the future greatly facilitate our transportation both along the Calumet line and along the line of the Amygdaloid shafts.

During the winter No. 9-10 shaft house was destroyed by fire. It was replaced in a remarkably short time and its loss interfered but little with our product. An extensive addition has been made to the machine shop, and three stalls for locomotives have been added to the roundhouse. We have laid the foundation of another large coal dock of a capacity of 100,000 tons, with a depth of water of over 21 feet along the face of the dock, at Torch Lake. We hope during the coming season to finish the dredging of our canal from Bootjack Bay to Torch Lake. We shall then have a depth of 20 feet and a base of 90 feet along its whole length, enabling us to bring the largest vessels navigating the lakes to our docks.

At the mills all the buildings are now protected with iron sheathing, and we are obtaining an abundant supply of water for our boilers from the driven wells sunk in our sand flats. We have also built a new carpenter shop at the mills. We are continuing at the mills our experiments relating to greater economy in stamping and washing our rock and in treating our mineral product.

At Buffalo we have purchased an additional frontage on Niagara River of about 200 feet; otherwise there have been no changes of importance at the Lake Linden or the Buffalo Smelting works. At Torch Lake we have begun to smelt the mineral of the Quincy Mining Company for the temporary accommodation of that company.

The expenditures on account of the aid fund for the fiscal year amounted to $51,977. In view of the prosperous business of the company, we have determined to pay, during the coming year, the contributions of the men to the fund. The monthly contribution to the aid fund, beginning with 1899, is to be reduced from 50 cents to 25 cents for men, and from 25 cents to 10 cents for boys. It is believed that with a like contribution from the company the income will be sufficient to meet the present conditions. The value of the aid fund at cost is $132,967.

The Tamarack produced a considerably larger quantity of mineral in 1897 than in 1896, having built a new mill which enlarged its capacity. The product was 29,589,380 pounds of mineral in 1897, as compared with 23,628,899 pounds in 1896. Of the total amount of rock broken from the lode—671,718 tons—611,539 tons were stamped at a cost of 26.413 cents per ton, the total cost per ton of rock stamped having been $2.07. The total receipts for copper and interest in 1897 were $2,267,340.75, while the total costs were $1,835,809.86, leaving a net

income of $431,530.89, from which dividends aggregating $360,000 were paid. Contrary to the former practice, there has been charged to operating expenses $204,922.73 for construction, which includes $45,351.28 for the new mill and $111,061.11 for sinking and construction at the new shaft, No. 5, which was sunk 1,029 feet, reaching a depth of 2,015 feet. The other shafts of the company have the following depths: No. 1, 3,240 feet; No. 2, 3,775 feet; No. 3, 4,526 feet, and No. 4, 4,450 feet. The new mill went into commission on March 15. The new and the old mill ran in time equivalent to one head running 1,914½ days. During that time there were stamped 611,539 tons of Tamarack rock and 25,908 tons of Tamarack, Jr., rock, a total of 637,447 tons, or 332.95 tons per head per day.

The Franklin mine in 1897 produced 3,585,854 pounds of mineral, yielding 2,908,284 pounds of copper. There were hoisted 147,121 tons of rock, of which 132,026 tons were sent to the stamp mill, yielding 1.358 per cent of mineral. The amount of mass and barrel work was 1,158,115 pounds. The income was $320,917.33, while the running expenses were $268,264.62, and the expense for freight, smelting, etc., was $43,180.85, leaving a balance of $9,471.86. The expenses include $120,082.32 for development work in the Franklin, Jr., on the Pewabic lode. Stoping for stamp rock in this new mine was begun late in October, and during November and December about 7,000 tons were shipped to the mill. The Franklin is building a new stamp mill.

In 1897 the Quincy Mining Company produced 20,630,625 pounds of mineral, yielding 16,924,618 pounds of refined copper, for which there has been realized the gross sum of $1,872,213.69. Sales of silver yielded $18,024.95; interest account, $8,267.24, and real estate account, $2,244.27.

The running expenses at the mine were $890,732.52; the smelting, transportation, and other expenses were $214,470.86; construction, $18,466.25, and taxes in Michigan, $45,801.69. This leaves the income of the year at $731,278.83. The balance on hand was $927,564.32 on January 1, 1897, and there was received from trust account $390,888.74. The dividends paid aggregated $800,000, and $38,560.60 were paid for the purchase of Mesnard and Pontiac lands. The Quincy is building a smelting plant on Pewabic Lake.

The following table shows the operations of the Quincy mine for a series of years. It illustrates well the steady increase in production, the fluctuations in the yield, the heavy decline in the price of copper, the crowding down of cost through improvements in spite of increasing depth, and the remarkable uniformity of wages paid. It should be stated that the average price realized is calculated from the gross income and the product, the reports failing to show the quantity of copper on hand at the beginning of each fiscal year, and the values at which it was put in.

ation of section 16, which is supposed to possess the continuation of the Baltic lode, $4,948.45, and the purchase of property $7,000. The net receipts over expenditures were $57,077.43, which carried the surplus up to $196,362.81.

The following record of cost for a series of years shows how it has been possible by close management to treat an ore yielding less than 0.75 per cent of copper.

*Cost of copper at the Atlantic mine per ton of rock treated.*

| Items of cost. | 1888. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|---|
| Mining, selecting, breaking, and all surface expenses, including taxes | *Cents.* 83.73 | *Cents.* 87.87 | *Cents.* 104.14 | *Cents.* 95.29 | *Cents.* 83.98 |
| Transportation to mill | 3.47 | 3.88 | 3.46 | 3.86 | 3.33 |
| Stamping and separating | 26.89 | 27.78 | 27.78 | 25.82 | 25.09 |
| Freight, smelting, marketing, and New York expenses | 21.42 | 20.22 | 20.37 | 18.47 | 17.67 |
| Total working expenses | 135.51 | 139.75 | 155.75 | 143.44 | 130.07 |
| Total expenditures, including construction | 142.82 | 153.27 | 166.70 | 154.51 | 133.51 |
| Net profit | 54.36 | 6.23 | 27.71 | 0.16 | ..... |
| Yield of copper, per cent | 0.667 | 0.663 | 0.650 | 0.615 | 0.615 |

| Items of cost. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Mining, selecting, breaking, and all surface expenses, including taxes | *Cents.* 79.49 | *Cents.* 75.18 | *Cents.* 75.25 | *Cents.* 76.43 | *Cents.* 73.43 |
| Transportation to mill | 3.28 | 3.03 | 4.08 | 4.96 | 4.54 |
| Stamping and separating | 24.95 | 23.30 | 22.20 | 24.87 | 23.94 |
| Freight, smelting, marketing, and New York expenses | 18.22 | 17.71 | 18.81 | 17.47 | 17.03 |
| Total working expenses | 125.94 | 119.22 | 120.34 | 123.73 | 118.94 |
| Total expenditures, including construction | 160.24 | 165.07 | 156.05 | 135.99 | 129.69 |
| Yield of copper, per cent | 0.669 | 0.703 | 0.730 | 0.660 | 0.648 |

An advance of wages of 10 per cent is mainly responsible for the increased cost in 1896.

Explorations have been prosecuted on section 16 of the Atlantic property to locate the continuation of the Baltic belt. From work done thus far underground it is probable that either a bend of the strata or a faulting has displaced the belt.

Comprehensive exploration work is being carried on by the Arcadian Copper Company, among the directors of which are men identified with the Standard Oil Company. The company has acquired seventeen different tracts of land, including the old copper properties of the Arcadian Mining Company, the Edwards, Concord, and Douglass, aggregating 2,846 acres. The land is traversed by the lode on which the Kearsarge and Wolverine are working and the lode on which the Isle Royale Consolidated is exploring. The company has acquired a stamp-mill site on Portage Lake near Grosse Point and the right of way for a railroad from the mines to the mill site.

Energetic work is progressing in opening up the old Isle Royale group of mines, two large shafts, capable of handling large quantities of rock, being sunk on the property.

Development work is also progressing with two shafts on the Winona property, which is closer to the old Mass mine.

The Adventure Consolidated Copper Company has undertaken the working of the old Adventure Hilton and Knowlton properties.

The most interesting work in fresh ground is, however, being conducted on what is known as the Baltic property, and this may enter the ranks of producers at an unexpectedly early date. Three large compartment shafts are being sunk, at distances of 900, 900, and 845 feet apart. A first level has been opened in both directions in two of them, this level being designed to become the adit level. Below it a second level has been started. One head of stamps is available at the Atlantic mill, and this will probably begin crushing Baltic rock before the close of 1898.

## MONTANA.

A good deal of caution must be exercised in compiling the statistics of the production of copper for the Butte district of Montana, because the furnace products of one property are sold for further working to the works of other companies. The duplication of metal has led to excess in returns. Besides, during 1898 a certain quantity of material originating in British Columbia has been worked in Butte. Full reports from all the works have made it possible to follow the metal closely and to eliminate such sources of error.

The growth in importance of Montana as a copper producer is shown in the following table:

*Montana's proportion of the copper product.*

| Year. | United States. | Montana. | | Lake Superior. |
|---|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Per cent.* | *Per cent.* |
| 1882 | 90,646,232 | 9,058,284 | 10.0 | 62.9 |
| 1883 | 115,526,053 | 24,664,346 | 21.4 | 51.6 |
| 1884 | 144,946,653 | 43,093,054 | 29.7 | 47.8 |
| 1885 | 165,875,483 | 67,797,864 | 40.9 | 43.5 |
| 1886 | 157,763,043 | 57,611,621 | 36.7 | 51.6 |
| 1887 | 181,477,331 | 78,699,677 | 43.4 | 41.9 |
| 1888 | 226,361,466 | 97,897,968 | 43.3 | 38.2 |
| 1889 | 226,775,962 | 98,222,444 | 43.3 | 38.9 |
| 1890 | 259,763,092 | 112,980,896 | 43.5 | 39.0 |
| 1891 | 284,121,764 | 112,063,320 | 39.4 | 40.2 |
| 1892 | 344,998,679 | 163,206,128 | 47.3 | 35.7 |
| 1893 | 329,354,398 | 155,209,133 | 47.1 | 34.2 |
| 1894 | 354,188,374 | 183,072,756 | 51.6 | 32.3 |
| 1895 | 380,613,404 | 190,172,150 | 50.0 | 34.0 |
| 1896 | 460,061,430 | 221,918,179 | 48.2 | 31.2 |
| 1897 | 494,078,274 | 230,288,141 | 46.6 | 29.4 |

The third annual report of the Anaconda Copper Mining Company for the fiscal year ending June 30 shows that 124,417,471 pounds of fine copper, about 5,300,000 ounces of silver, and 16,610 ounces of gold were produced. The quantity of copper sold was larger, as is exhibited in the following table of sales and prices realized:

*Sales and prices of Anaconda product.*

| Fiscal year. | Copper. | | Silver. | | Gold. | |
|---|---|---|---|---|---|---|
| | Pounds sold. | Price, cents, per pound. | Ounces sold. | Price, cents, per ounce. | Ounces sold. | Price per ounce. |
| 1895–96 | 85,476,795 | 10.03 | 4,498,560 | 67.91 | 14,384 | $20.62 |
| 1896–97 | 120,864,097 | 10.76 | 6,057,067 | 64.08 | 18,511 | 20.65 |
| 1897–98 | 135,002,147 | 10.82 | 5,706,377 | 56.73 | 19,930 | 20.67 |

The receipts for 1897–98 were $14,605,588.45 for copper as compared with $13,003,955.10 during the previous fiscal year, $3,237,277.58 and $3,881,551.75, respectively, for silver, and $411,983.28 and $382,259.70, respectively, for gold, the totals being $18,254,849.31 for 1897–98 and $17,267,766.55 for 1896–97. The value of the stock of copper, silver,

and gold on hand declined from $5,521,031.48 on June 30, 1897, to $4,052,870.43 on June 30, 1898. The income from royalties, rents, and dividends was $79,384.49, the profit for the fiscal year having been $3,551,346.22 as compared with $5,136,048 in 1896–97.

Owing to the breaking out of an old fire in the Anaconda group of mines, these did not furnish as much ore as in former years, the shipments amounting to 628,051 tons; but the Syndicate group furnished 813,487 tons, so that the total shipments, 1,441,538 tons, were 33,169 tons in excess of the previous year. The report presents a detailed schedule of the mining expenditure of both groups, the totals being $3,059,212.65 for the Syndicate and $2,686,571.55 for the Anaconda group. The heaviest items in the two cost accounts, respectively, are: $117,501.17 and $90,360.11 for coal, $255,946.16 and $196,134.83 for freight on ore, $1,825,931.05 and $1,550,570.78 on labor, $91,359.08 and $55,936.72 on powder, $248,133.42 and $181,753.49 on timber, $177,499.18 and $203,031.71 for repairs on machinery and plant, and $89,637.54 and $148,733.36 for new construction.

The total cost for the 1,441,538 tons shipped for mining was $5,745,784.20 less $241,861.61, the latter representing one-half the profit on subsidiary departments like coal mines, foundry, timber, lands, etc. The cost of mining was, therefore, $3.82 per ton.

There was received at the reduction works 1,459,249 tons of ore, of which 17,711 tons was custom ore, purchased. The following statement shows the details of reduction works expenditures.

*Reduction works expenditures at Anaconda Copper Company's plant.*

| | Amount. |
|---|---|
| Custom ores | $164,398.29 |
| Concentrating | 1,124,508.96 |
| Smelting | 2,810,268.98 |
| Converting—casting | 1,073,938.85 |
| Blast furnace | 390,106.96 |
| Refining | 603,123.77 |
| Reduction of silver mined | 73,467.10 |
| Milling (construction) | 10,125.76 |
| Total | 6,249,938.67 |
| Deduct one-half profit of subsidiary departments | 241,861.62 |
| | 6,008,077.05 |

Interesting details of costs for the reduction plant are submitted. For concentrating the principal items are: $413,380.96 for labor, $319,420.82 for power-house expenses, $52,551.03 for repairs to buildings and structures, $120,232.67 for repairs and renewals of machinery, $48,445.92 for half the cost of a flume, and $36,531.72 for new machinery.

In the smelting department the heaviest outlays were: $1,249,981.05 for coal, $817,289.62 for labor, $142,540.23 for power-house expenses, $54,799.93 for repairs to buildings, $196,494.58 for repairs to machinery and plant, $122,619.91 for four Holthoff-Wethey calcining furnaces, $48,445.94 for half the cost of a flume, $30,417.34 for two reverberatory matte furnaces, and $15,738.52 for new machinery.

For converting and casting the outlay for fuel was $136,622.35; for labor, $484,711.01; for power-house expenses, $112,100.92; for silica, $57,821.95; for repairs to machinery and plant, $96,366.52, and for new construction, $102,774.94. The latter included three new converter stands and nine converters with equipment, which carries the capacity, with 15 stands, up to an output of 14,000,000 pounds of copper per month.

In the blast-furnace department the principal items of cost were: $209,634.94 for coke, $86,258.77 for labor, and $40,573.68 for lime rock.

The refinery has been considerably extended, the total outlays for construction being $159,611.50.

The principal current expenses were $136,361.57 for labor and $199,499.16 for power-house expenses. The product was 60,307,985 pounds of electrolytic copper, of which 99.9 per cent. was above the requirements and tests of the highest-grade copper.

The total outlays for construction and new permanent improvements at the mines and reduction works, all charged to operating expenses, aggregated $802,956.69.

Besides the total cost at the mines of $11,511,999.64, the outlays were: $696,297.66 for railroad and ocean freights, $968,891.38 for refining charges at the seaboard, $34,899.62 interest on advances, and $102,638.23 general expense.

The gross receipts of the Boston and Montana Company during 1897 were $6,949,097.23, from which are deducted the outlays at the mines and smelters, $3,274,579.87, and the expenses of handling copper, such as freight, copper charges, commissions, etc., $658,080.38, leaving a net income of $3,016,436.98. From this is deducted $133,438.01 for sinking fund and interest on bonded debt, leaving $2,882,998.97 applicable to dividends, which were paid to the amount of $1,800,000, or $12 per share. Besides, there was set aside for bonds maturing $138,541.06, and for real estate purchased $200,383.15, leaving a net surplus for the year of $744,074.76.

The directors report that although the ores treated have averaged 2 per cent less copper than the ores treated in 1896, and that the high-grade ores held in reserve have not been drawn upon, the product of

The Arizona Copper Company, Limited, is a Scotch corporation which works the Metcalf mines and owns the Arizona and New Mexico Railroad. During the fiscal year ending September 30, 1897, the total receipts for copper were £278,153, while cost of mining, smelting, and transportation and other expenses were £192,954, leaving a balance of £85,199 as mining profit, from which must be deducted £7,303 for general expenses, leaving a net profit of £77,896. The net railroad earnings were £51,044, making a total of £128,940. Interest, sinking fund, and dividends on preferred stock absorbed £55,166, leaving available £73,774, of which £47,480 were distributed in dividends on the common stock.

There were mined 128,886 tons of ore, of which 53,692 tons were concentrated, yielding 9,810 tons of concentrates.

Among the new mines to be added to Arizona's list is the Middlemarch, which will appear in the ranks of producers in 1898.

### NEW MEXICO.

From New Mexico the principal product has been from the Copper Flat mine, near Fort Bayard, the shipping point for the furnace material being Halls Station.

### IDAHO.

The New York and Idaho Smelting Company has established a plant at Cuprum, Idaho, but no copper has been marketed as yet, the work of developing the mines being still under way.

### CALIFORNIA.

The Montana Copper Company, at Keswick, California, has, during 1898, become one of the larger producers of the country, and is solely responsible for the increase in the production of the State. During the first six months of 1898 103,000 tons of ore, averaging 7.53 per cent, were extracted from the mine and 72,000 tons were smelted, producing 4,329 long tons of copper in matte. The productive capacity is increased.

### IMPORTS.

The imports of fine copper contained in ores, and of regulus and black copper, and of ingot copper, old copper, plates not rolled, rolled plates, sheathing metal, and manufactures not otherwise specified, and of brass, are given in the following tables:

*Fine copper contained in ores, and regulus and black copper imported and entered for consumption in the United States, 1867 to 1897, inclusive.*

| Year ending— | Fine copper contained in ores. | | Regulus and black copper. (a) | | Total value. |
|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | |
| | *Pounds.* | | *Pounds.* | | |
| June 30, 1867 | ..... | $936,271 | ..... | ..... | $936,271 |
| 1868 | 3,496,994 | 197,203 | ..... | ..... | 197,203 |
| 1869 | 24,960,604 | 448,487 | ..... | ..... | 448,487 |
| 1870 | 1,936,875 | 134,736 | ..... | ..... | 134,736 |
| 1871 | 411,315 | 42,453 | 499 | $60 | 42,513 |
| 1872 | 584,878 | 69,017 | 4,247 | 1,083 | 70,100 |
| 1873 | 702,086 | 80,132 | 1,444,239 | 279,631 | 359,763 |
| 1874 | 606,266 | 70,633 | 28,880 | 5,397 | 76,030 |
| 1875 | 1,337,104 | 161,903 | 12,518 | 2,076 | 163,979 |
| 1876 | 538,972 | 68,922 | 8,584 | 1,613 | 70,535 |
| 1877 | 76,637 | 9,756 | 1,874 | 260 | 10,016 |
| 1878 | 87,039 | 11,785 | ..... | ..... | 11,785 |
| 1879 | 51,959 | 6,199 | ..... | ..... | 6,199 |
| 1880 | 1,165,283 | 173,712 | 2,201,394 | 337,163 | 510,875 |
| 1881 | 1,077,217 | 124,477 | 402,640 | 51,633 | 176,110 |
| 1882 | 1,473,109 | 147,416 | 224,052 | 30,013 | 177,429 |
| 1883 | 1,115,386 | 113,349 | ..... | ..... | 113,349 |
| 1884 | 2,204,070 | 219,957 | 2,036 | 204 | 220,161 |
| 1885 | 3,665,739 | 343,793 | 285,322 | 20,807 | 364,600 |
| Dec. 31, 1886 | 4,503,400 | 341,558 | 1,960 | 98 | 341,656 |
| 1887 | 3,886,192 | 194,785 | 27,650 | 1,366 | 196,151 |
| 1888 | 4,859,812 | 381,477 | 4,971 | 324 | 381,801 |
| 1889 | 3,772,838 | 274,649 | 60,525 | 4,244 | 278,893 |
| 1890 | 3,448,237 | 241,732 | 221,838 | 15,688 | 257,420 |
| 1891 | 8,931,554 | 774,057 | 2,403,919 | 214,877 | 988,934 |
| 1892 | 7,669,978 | 453,474 | 303,087 | 17,390 | 470,864 |
| 1893 | 7,256,015 | *435,448 | 3,175,559 | 202,197 | 637,645 |
| 1894 | 4,804,614 | 260,402 | 5,873,820 | 144,832 | 405,234 |
| 1895 | b8,921,920 | 213,689 | b3,104,640 | 125,853 | 339,542 |
| 1896 | b2,620,800 | 126,580 | b3,427,200 | 210,725 | 337,305 |
| 1897 | b3,919,680 | 683,497 | 2,974,720 | 226,704 | 910,201 |

a Not enumerated until 1871. b Ores.

*Copper imported and entered for consumption in the United States, 1867 to 1897, inclusive.*

| Year ending. | Bars, ingots, and pigs. | | Old, fit only for remanufacture. | | Old, taken from bottoms of American ships abroad. (a) | |
|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | Quantity. | Value. |
| | *Pounds.* | | *Pounds.* | | *Pounds.* | |
| June 30, 1867 | 1,635,953 | $287,831 | 569,732 | $81,930 | ..... | ..... |
| 1868 | 61,394 | 6,935 | 318,705 | 42,652 | ..... | ..... |
| 1869 | 13,212 | 2,143 | 290,780 | 34,820 | ..... | ..... |
| 1870 | 5,157 | 418 | 255,386 | 31,931 | ..... | ..... |
| 1871 | 3,316 | 491 | 369,634 | 45,672 | ..... | ..... |
| 1872 | 2,638,589 | 578,965 | 1,144,142 | 178,536 | ..... | ..... |
| 1873 | 9,697,608 | 1,984,122 | 1,413,010 | 255,711 | 32,307 | $4,913 |
| 1874 | 713,935 | 134,326 | 733,326 | 137,087 | 9,500 | 930 |
| 1875 | 58,475 | 10,741 | 396,320 | 55,564 | 11,636 | 1,124 |
| 1876 | 5,281 | 788 | 239,987 | 35,545 | 10,304 | 1,981 |
| 1877 | 230 | 30 | 219,443 | 28,608 | 41,482 | 5,136 |
| 1878 | 1 | 1 | 198,749 | 25,585 | ..... | 6,004 |
| 1879 | 2,515 | 352 | 112,642 | 11,997 | 11,000 | 1,107 |
| 1880 | 1,242,103 | 206,121 | 695,255 | 91,234 | ..... | ..... |
| 1881 | 219,802 | 36,168 | 541,074 | 63,383 | 14,680 | 1,504 |
| 1882 | 6,200 | 836 | 508,901 | 59,629 | 16,075 | 1,629 |
| 1883 | ..... | ..... | 330,495 | 36,166 | 9,415 | 666 |
| 1884 | b542 | 107 | 149,701 | 12,099 | ..... | 554 |
| 1885 | 914 | 172 | 81,312 | 6,658 | ..... | 1,160 |
| Dec. 31, 1886 | 276 | 37 | 37,149 | 2,407 | ..... | 584 |
| 1887 | 212 | 22 | 39,957 | 2,374 | ..... | 120 |
| 1888 | 1,787 | 299 | 37,620 | 2,535 | ..... | ..... |
| 1889 | 3,160 | 522 | 19,912 | 1,176 | ..... | ..... |
| 1890 | 5,189 | 859 | 284,789 | 26,473 | ..... | ..... |
| 1891 | 2,556 | 389 | 134,407 | 9,685 | ..... | ..... |
| 1892 | 22,097 | 2,588 | 71,485 | 6,114 | ..... | ..... |
| 1893 | 554,348 | 58,480 | 59,375 | 6,945 | ..... | 6,326 |
| 1894 | 606,415 | 42,688 | 160,592 | 15,726 | ..... | 1,143 |
| 1895 | 7,979,322 | 726,347 | 1,336,901 | 109,340 | ..... | ..... |
| 1896 | 9,074,379 | 750,976 | 2,422,554 | 196,419 | ..... | ..... |
| 1897 | 12,646,552 | 1,142,526 | 1,780,390 | 158,829 | ..... | ..... |

a Not enumerated until 1873. b Includes "plates not rolled" since 1884.

*Copper imported and entered for consumption in the United States, etc.*—Continued.

| Year ending— | Plates not rolled. | | Plates rolled, sheets, pipes, etc. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Pounds.* | | *Pounds.* | |
| June 30, 1867 | | | | $1,101 |
| 1868 | | | | 1 |
| 1869 | | | | 39 |
| 1870 | | | | 2,039 |
| 1871 | 430 | $129 | | 7,487 |
| 1872 | 148,192 | 33,770 | | 18,895 |
| 1873 | 550,431 | 97,888 | | 4,514 |
| 1874 | | | | 27 |
| 1875 | 8 | 4 | | 617 |
| 1876 | 5,467 | 600 | | 326 |
| 1877 | | | | 203 |
| 1878 | | | | 1,201 |
| 1879 | 27,074 | 4,496 | | 786 |
| 1880 | 120 | 11 | | 4,134 |
| 1881 | 20 | 3 | | 82 |
| 1882 | | | 5,855 | 1,551 |
| 1883 | | | 2,842 | 379 |
| 1884 | | | 6,529 | 2,330 |
| 1885 | | | 470 | 120 |
| Dec. 31, 1886 | | | 3,770 | 339 |
| 1887 | | | 37,925 | 5,493 |
| 1888 | | | 5,208 | 737 |
| 1889 | | | 13,848 | 2,062 |
| 1890 | | | 4,209 | 917 |
| 1891 | | | 122,219 | 23,291 |
| 1892 | | | 1,788 | 600 |
| 1893 | | | 7,056 | 1,065 |
| 1894 | | | 12,681 | 1,821 |
| 1895 | | | 27,156 | 2,586 |
| 1896 | | | 34,481 | 4,834 |
| 1897 | | | 3,116 | 430 |

*Copper imported and entered for consumption in the United States, etc.*—Continued.

| Year ending— | Sheathing metal, in part copper. (a) | | Manufactures not otherwise specified. | Total value. |
|---|---|---|---|---|
| | Quantity. | Value. | Value. | |
| | *Pounds.* | | | |
| June 30, 1867 | 220,889 | $37,717 | $15,986 | $424,565 |
| 1868 | 101,488 | 18,852 | 21,492 | 89,932 |
| 1869 | 43,660 | 6,592 | 43,212 | 86,806 |
| 1870 | ..... | ..... | 485,220 | 519,608 |
| 1871 | ..... | ..... | 668,894 | 722,673 |
| 1872 | ..... | ..... | 1,007,744 | 1,817,910 |
| 1873 | ..... | ..... | 869,281 | 3,216,429 |
| 1874 | 282,406 | 50,174 | 125,708 | 448,252 |
| 1875 | 136,055 | 23,650 | 35,572 | 127,272 |
| 1876 | 18,014 | 2,903 | 29,806 | 71,949 |
| 1877 | 110 | 22 | 41,762 | 75,761 |
| 1878 | 647 | 55 | 35,473 | 68,319 |
| 1879 | 300 | 20 | 39,277 | 58,035 |
| 1880 | 6,044 | 693 | 130,329 | 432,522 |
| 1881 | 39,520 | 4,669 | 284,509 | 390,318 |
| 1882 | ..... | ..... | 77,727 | 141,372 |
| 1883 | 6,791 | 1,047 | 40,343 | 78,601 |
| 1884 | 19,637 | 926 | 55,274 | 71,290 |
| 1885 | 86,619 | 9,894 | 61,023 | 79,027 |
| Dec. 31, 1886 | 21,573 | 1,917 | 31,871 | 37,155 |
| 1887 | 18,189 | 1,867 | 37,289 | 47,174 |
| 1888 | 23,622 | 2,696 | 14,567 | 20,834 |
| 1889 | 23,520 | 2,572 | 13,430 | 19,782 |
| 1890 | 37,458 | 4,467 | 24,752 | 57,468 |
| 1891 | 228,486 | 29,112 | 12,926 | 75,403 |
| 1892 | 417,134 | 51,380 | 49,764 | 110,446 |
| 1893 | 1,670 | 167 | 16,166 | 89,149 |
| 1894 | 8,422 | 1,470 | 3,851 | 66,699 |
| 1895 | 5,698 | 389 | 13,166 | 851,828 |
| 1896 | 3,183 | 303 | 20,953 | 973,485 |
| 1897 | 15,282 | 1,929 | 30,729 | 1,334,443 |

a Does not include copper sheathing in 1867, 1868, and 1869.

The source of the imports of fine copper in ore into the United States during 1893 and 1894 is shown in the following table. For 1895, 1896, and 1897 the tonnage of material is given.

*Imports of fine copper in ore in 1893, 1894, 1895, 1896, and 1897.*

| Countries from which imported. | 1893. | | 1894. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Pounds.* | | *Pounds.* | |
| Spain | 166,870 | $11,680 | ..... | ..... |
| Dominion of Canada: | | | | |
| Nova Scotia, New Brunswick, etc | 1,344 | 48 | ..... | ..... |
| Quebec, Ontario | 4,795,704 | 307,000 | 4,599,505 | $342,790 |
| British Columbia | 7,790 | 778 | 78,380 | 7.838 |
| Newfoundland and Labrador | 1,788,261 | 91,099 | 2,028,261 | 113,931 |
| Mexico | 639,606 | 41,201 | 303,782 | 18,356 |
| Venezuela | 257,112 | 12,570 | 236,750 | 11,099 |
| All other countries | 66,700 | 3,612 | *a* 4,479 | 408 |
| Total | 7,723,387 | 467,988 | 7,251,157 | 494,422 |

| Countries from which imported. | 1895 (ore and regulus). | | 1896 (ore and regulus). | | 1897 (ore and matte). | |
|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | Quantity. | Value. |
| | *Tons.* | | *Tons.* | | *Tons.* | |
| Germany | ..... | ..... | ..... | ..... | 10 | $2,125 |
| Dominion of Canada: | | | | | | |
| Quebec, Ontario | 1,168 | $72,099 | 529 | $22,638 | 243 | 24,191 |
| British Columbia | 1,135 | 117,888 | 1,031 | 43,302 | 3,453 | 714,078 |
| Newfoundland and Labrador | 5,467 | 15,510 | ..... | ..... | ..... | ..... |
| Mexico | 1,853 | 198,171 | ..... | ..... | 1,562 | 76,072 |
| All other countries | 11 | 771 | 1,171 | 282,689 | 5 | 124 |
| Total | 9,634 | 404,439 | 2,731 | 348,629 | 5,273 | 816,590 |

*a* All from Peru.

For the year 1893 the above table includes 467,372 pounds which were either reexported or entered in bonded warehouses and not withdrawn during 1893, so that the actual amount of imported fine copper contained in ores consumed in the United States in 1893 was 7,256,015 pounds.

The imports of pigs, bars, and old copper during 1897, by countries, were as follows:

*Imports of pigs, bars, and old copper, by countries of origin, in 1897.*

| Country. | Quantity. | Value. |
|---|---|---|
| | *Pounds.* | |
| Germany | 68,080 | $13,265 |
| United Kingdom | 597,468 | 75,937 |
| Quebec, Ontario, etc | 96,049 | 7,198 |
| British Columbia | 1,166,364 | 143,759 |
| Mexico | 11,995,023 | 929,641 |
| West Indies: | | |
| British | 352,594 | 29,584 |
| San Domingo | 82,521 | 8,086 |
| Cuba | 1,029,832 | 86,948 |
| Chile | 895,987 | 97,130 |
| Japan | 514,567 | 53,194 |
| All others | 124,613 | 9,274 |
| Total | 16,923,098 | 1,454,016 |

At least one-half of the copper imported from Mexico is furnace material smelted in that country and forwarded for refining to electrolytic works in the United States. It is probable that a part, possibly the whole, of the balance is merely Mexican product in transit to Europe. The statement of imports shows that there were received through Corpus Christi, Tex., 2,971,420 pounds, and through Arizona, 2,035,594 pounds.

The British Columbia imports are, of course, new copper, but the quantity credited to Cuba is understood to be entirely old material, from the wreckage of the sugar-plantation machinery.

The channels through which copper ore and matte are introduced into the country, as reported, throw some light on the material. The following table enumerates the districts into which the material was imported:

*Imports of copper ore and regulus, 1897, by ports.*

| | Long tons. | Value. |
|---|---|---|
| Newark, N. J | 142 | $23,377 |
| Corpus Christi, Tex | 283 | 6,867 |
| Paso del Norte, Tex | 212 | 37,453 |
| Saluria, Tex | 972 | 22,534 |
| Arizona | 59 | 7,468 |
| Puget Sound, Wash | 2,188 | 517,067 |
| Memphremagog, Vt | 35 | 3,125 |
| Oswegatchie, N. Y | 20 | 4,467 |
| Kansas City, Mo | 909 | 147,223 |
| Omaha, Nebr | 169 | 26,411 |
| All others | 96 | 3,999 |
| Total | 5,085 | 799,991 |

Since the imports of British Columbia mattes aggregated 3,453 tons, it is evident that they went chiefly to Butte, Kansas City, and Omaha for treatment, while the Mexican mattes were worked at other points.

It is quite evident that the Bureau of Statistics of the Treasury Department does not classify as copper ore the large quantities of cupriferous pyrites which are handled in this country, nor do the records apparently cover the copper contents of the nickel mattes brought in from the Sudbury district. The absence of any data as to the copper contents of the ores and mattes returned in the import statistics, or of the contents of pyrites and nickel mattes, makes it a somewhat difficult matter to estimate the actual imports. Returns from the refiners, however, indicate that an estimate of 6,150,000 pounds for 1897 is justified for copper-nickel mattes alone.

## EXPORTS.

The exports of copper in the form of ore (including matte), ingots, and manufactured copper for a series of years have been as follows:

*Copper and copper ore of domestic production exported from the United States, 1864 to 1897.*

[Cwts. are long hundredweights of 112 pounds.]

| Year ending— | Ore and matte. | | Pigs, bars, sheets, and old. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Cwts.* | | *Pounds.* | |
| June 30, 1864 | 109,581 | $181,298 | 102,831 | $43,229 |
| 1865 | 225,197 | 553,124 | 1,572,382 | 709,106 |
| 1866 | 215,080 | 792,450 | 123,444 | 33,553 |
| 1867 | 87,731 | 317,791 | [a]4,637,867 | 303,048 |
| 1868 | 92,612 | 442,921 | 1,350,896 | 327,287 |
| 1869 | 121,418 | 237,424 | 1,134,360 | 233,932 |
| 1870 | [a]19,198 | 537,505 | 2,214,658 | 385,815 |
| 1871 | [a]54,445 | 727,213 | 581,650 | 133,020 |
| 1872 | 35,564 | 101,752 | 267,868 | 64,844 |
| 1873 | 45,252 | 170,365 | 38,958 | 10,423 |
| 1874 | 13,326 | 110,450 | 503,160 | 123,457 |
| 1875 | [a]51,305 | 729,578 | 5,123,470 | 1,042,536 |
| 1876 | 15,304 | 84,471 | 14,304,160 | 3,098,395 |
| 1877 | 21,432 | 109,451 | 13,461,553 | 2,718,213 |
| 1878 | 32,947 | 169,020 | 11,297,876 | 2,102,455 |
| 1879 | 23,070 | 102,152 | 17,200,739 | 2,751,153 |
| 1880 | 21,623 | 55,763 | 4,206,258 | 667,242 |
| 1881 | 9,958 | 51,499 | 4,865,407 | 786,860 |
| 1882 | 25,936 | 89,515 | 3,340,531 | 565,295 |
| 1883 | 112,923 | 943,771 | 8,221,363 | 1,293,947 |
| 1884 | 386,140 | 2,930,895 | 17,044,760 | 2,527,829 |
| 1885 | 432,300 | 4,739,601 | 44,731,858 | 5,339,887 |
| Dec. 31, 1886 | 417,520 | 2,241,164 | 19,553,421 | 1,968,772 |
| 1887 | 501,280 | 2,774,464 | 12,471,393 | 1,247,928 |
| 1888 | 794,960 | 6,779,294 | 31,706,527 | 4,906,805 |
| 1889 | 818,500 | 8,226,206 | 16,813,410 | 1,896,752 |
| 1890 | 431,411 | 4,413,067 | 10,971,899 | 1,365,379 |
| 1891 | 672,120 | 6,565,620 | 69,279,024 | 8,844,304 |
| 1892 | [b]943,040 | 6,479,758 | 30,515,736 | 3,438,048 |
| 1893 | 835,040 | 4,257,128 | 138,984,128 | 14,213,378 |
| 1894 | 87,040 | 440,129 | 162,393,000 | 15,324,925 |
| 1895 | 276,480 | 1,631,251 | 121,328,390 | 12,222,769 |
| 1896 | 414,265 | 2,393,914 | 259,223,924 | 27,822,280 |
| 1897 | 181,280 | 1,199,029 | 277,255,742 | 30,597,645 |

[a] Evidently errors in quantities. [b] Corrected figures.

*Copper and copper ore of domestic production exported, etc.*—Continued.

[Cwts. are long hundredweights of 112 pounds.]

| Year ending— | Value of manufactured product. | Total value. |
|---|---|---|
| June 30, 1864 | $208,043 | $432,570 |
| 1865 | 282,640 | 1,544,870 |
| 1866 | 110,208 | 936,211 |
| 1867 | 171,062 | 791,901 |
| 1868 | 152,201 | 922,409 |
| 1869 | 121,342 | 592,698 |
| 1870 | 118,926 | 1,042,246 |
| 1871 | 55,198 | 915,431 |
| 1872 | 121,139 | 287,735 |
| 1873 | 78,288 | 259,076 |
| 1874 | 233,301 | 467,208 |
| 1875 | 43,152 | 1,815,266 |
| 1876 | 343,544 | 3,526,410 |
| 1877 | 195,730 | 3,023,394 |
| 1878 | 217,446 | 2,488,921 |
| 1879 | 79,900 | 2,933,205 |
| 1880 | 126,213 | 849,218 |
| 1881 | 38,036 | 876,395 |
| 1882 | 93,646 | 748,456 |
| 1883 | 110,286 | 2,348,004 |
| 1884 | 137,135 | 5,595,859 |
| 1885 | 107,536 | 10,187,024 |
| Dec. 31, 1886 | 76,386 | 4,386,322 |
| 1887 | 92,064 | 4,114,456 |
| 1888 | 211,141 | 11,897,240 |
| 1889 | 86,764 | 10,209,722 |
| 1890 | 139,949 | 5,918,395 |
| 1891 | 293,619 | 15,703,543 |
| 1892 | 245,064 | 10,162,870 |
| 1893 | 464,991 | 18,935,497 |
| 1894 | 378,040 | 16,143,094 |
| 1895 | 1,084,289 | 14,938,309 |
| 1896 | 819,017 | 31,035,211 |
| 1897 | 958,379 | 32,755,053 |

The destination of our exports of copper bars, ingots, plates, and old copper during the years 1895, 1896, and 1897 is shown by the following table, the data having been furnished by the Bureau of Statistics:

*Exports of copper bars and ingots for 1895, 1896, and 1897.*

| Countries. | 1895. | 1896. | 1897. |
|---|---|---|---|
| | *Pounds.* | *Pounds.* | *Pounds.* |
| United Kingdom | 24,064,694 | 78,479,716 | 63,774,004 |
| Austria | 3,228,545 | 6,532,949 | 5,918,993 |
| Belgium | 8,384,995 | 9,648,271 | 16,651,776 |
| France | 25,266,032 | 45,502,864 | 59,630,864 |
| Germany | 14,962,257 | 29,609,837 | 29,746,200 |
| Italy | 901,485 | 4,067,160 | 3,757,920 |
| Netherlands | 40,451,380 | 72,994,600 | 86,581,616 |
| Russia | 2,968,001 | 10,741,821 | 8,515,772 |
| Mexico | 151,664 | 170,340 | 2,678,597 |
| British North America | 398,906 | 234,845 | |
| West Indies | 1,721 | 1,241,705 | |
| Other countries | 548,710 | | |
| Total | 121,328,390 | 259,224,108 | 277,255,742 |

Of course, practically all the copper returned as having been shipped to Holland is really merely in transit to Germany, and this is true also as regards the greater part of that shipped to Belgium, some of the latter, however, probably going to France.

A large percentage of the total exports of copper bars and ingots goes from New York, Baltimore, and New Orleans, as shown in the following table. During the year 1898 growing quantities of copper have been forwarded from the last-named port. This is due to the fact that the Boleo Company of Lower California is sending a part of its product in transit through this country to Europe, New Orleans being the shipping port. The following table shows the export ports.

*Exports of ingots, bars, and old copper in 1897.*

| District. | Quantity. | Value. |
|---|---|---|
| | *Pounds.* | |
| Baltimore, Md | 88,389,939 | $9,830,604 |
| Boston and Charlestown, Mass | 928,584 | 103,431 |
| Newport News, Va | 5,899,609 | 644,973 |
| New York, N. Y | 167,344,812 | 18,603,642 |
| Philadelphia, Pa | 227,023 | 20,760 |
| New Orleans, La | 13,882,408 | 1,354,550 |
| Detroit, Mich | 164,317 | 18,087 |
| Huron, Mich | 229,236 | 24,339 |
| Vermont, Vt | 102,718 | 11,425 |
| All others | 87,106 | 16,134 |
| Total | 277,255,742 | 30,627,945 |

The exports of ore and matte aggregated 9,064 long tons, valued at $1,199,029, of which 8,000 tons, valued at $1,062,938, went to Great Britain, and 773 tons, valued at $84,273, to Mexico. It is understood that the latter movement is due to the shipment of material from the Arizona plant to a Mexican works for a special purpose.

## THE COPPER MARKETS.

The following table summarizes the highest and lowest prices obtained for Lake copper monthly in the New York markets from 1860 to 1897, both inclusive:

*Highest and lowest prices of Lake Superior ingot copper, by months, from 1860 to 1897.*

[Cents per pound.]

| Year. | January. | | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1860..... | 24 | 23½ | 24 | 23⅝ | 23⅝ | 23 | 23½ | 23 | 23½ | 22⅝ | 22½ | 21⅝ |
| 1861..... | 20 | 19 | 19½ | 19 | 19⅝ | 19½ | 19⅝ | 19 | 19⅝ | 19½ | 19 | 18 |
| 1862..... | 28 | 27 | 28 | 25 | 25 | 23 | 23 | 21½ | 21½ | 20⅝ | 23 | 20⅝ |
| 1863..... | 35 | 31 | 37 | 35 | 37 | 31 | 31 | 30 | 30½ | 30 | 30½ | 30 |
| 1864..... | 41½ | 39 | 42 | 41½ | 42½ | 41½ | 44 | 42½ | 44 | 43 | 49 | 44 |
| 1865..... | 50½ | 46 | 46 | 44 | 44½ | 34 | 35 | 34 | 34 | 30 | 30½ | 28½ |
| 1866..... | 42 | 38 | 38 | 35½ | 35½ | 29½ | 30 | 28½ | 31 | 29 | 33 | 31 |
| 1867..... | 29½ | 27 | 27⅝ | 27½ | 27½ | 24 | 24½ | 23½ | 24½ | 24 | 24½ | 24 |
| 1868..... | 23½ | 21½ | 24 | 22½ | 24 | 23½ | 24½ | 23½ | 24½ | 24 | 24 | 23⅛ |
| 1869..... | 26½ | 23⅝ | 27 | 26 | 26⅝ | 24 | 24 | 23½ | 24½ | 23⅝ | 23⅝ | 22 |
| 1870..... | 22 | 21½ | 21½ | 20⅞ | 20⅝ | 19 | 19⅝ | 19½ | 19½ | 19 | 20⅛ | 19 |
| 1871..... | 22⅞ | 22 | 22⅝ | 21⅞ | 22 | 21½ | 21⅝ | 21½ | 21⅝ | 21⅛ | 21½ | 21½ |
| 1872..... | 28½ | 27½ | 28⅝ | 28½ | 30½ | 28⅛ | 44 | 30½ | 42 | 36 | 34⅝ | 33 |
| 1873..... | 35 | 32½ | 35 | 34 | 35 | 34½ | 34½ | 33½ | 33½ | 32 | 31½ | 29⅛ |
| 1874..... | 25 | 24½ | 25 | 24½ | 24⅝ | 24 | 25 | 24⅝ | 25 | 24½ | 24⅝ | 24½ |
| 1875..... | 23½ | 21½ | 22⅝ | 21⅝ | 21⅝ | 21½ | 21⅝ | 21½ | 23½ | 22⅛ | 23 | 23 |
| 1876..... | 23½ | 23 | 22½ | 22½ | 22½ | 22 | 22⅛ | 22 | 22½ | 21 | 21 | 19½ |
| 1877..... | 19½ | 19 | 20½ | 19½ | 19½ | 19 | 19½ | 19½ | 19½ | 19 | 19⅛ | 19 |
| 1878..... | 17⅛ | 17½ | 17½ | 17⅛ | 17½ | 16⅞ | 17 | 16⅞ | 16⅝ | 16½ | 16⅝ | 16½ |
| 1879..... | 16 | 15½ | 15½ | 15½ | 15⅝ | 15⅝ | 16 | 15⅝ | 16½ | 16 | 16½ | 16⅛ |
| 1880..... | 25 | 21⅛ | 24½ | 24 | 24 | 22⅝ | 22½ | 24 | 21 | 18 | 18½ | 17⅞ |
| 1881..... | 19⅜ | 19⅜ | 19⅜ | 19⅛ | 19⅜ | 19 | 19 | 18⅝ | 18⅞ | 18½ | 18½ | 16⅜ |
| 1882..... | 20⅜ | 20½ | 20 | 19 | 19½ | 18⅞ | 18⅞ | 17⅞ | 18½ | 18 | 18½ | 18 |
| 1883..... | 18⅛ | 18 | 17½ | 17⅝ | 17⅛ | 17⅛ | 16 | 15⅝ | 16 | 15⅞ | 15⅞ | 15 |
| 1884..... | 15 | 14⅞ | 15 | 14⅞ | 15 | 14⅞ | 15 | 14½ | 14½ | 14⅛ | 14½ | 14 |
| 1885..... | 11½ | 10⅜ | 11⅞ | 10⅜ | 11⅛ | 10⅜ | 11½ | 10 1/10 | 11½ | 9⅜ | 11½ | 11 |
| 1886..... | 11⅜ | 11⅜ | 11⅜ | 11⅜ | 11½ | 11⅜ | 11½ | 11⅜ | 11⅛ | 10 | 10⅛ | 10 |
| 1887..... | 12 | 11½ | 11½ | 10⅛ | 10½ | 10⅜ | 10½ | 10 | 10 | 9 19/20 | 10½ | 10 |
| 1888..... | 17 4/10 | 15 17/20 | 16 6/10 | 16 | 16 7/20 | 15 11/20 | 16 9/10 | 16 | 16⅝ | 16 3/10 | 16½ | 16 9/20 |
| 1889..... | 17½ | 16½ | 16⅝ | 16½ | 15⅝ | 15 | 16 | 15½ | 12⅛ | 12 | 12 13/40 | 12 |
| 1890..... | 14½ | 14½ | 14½ | 14½ | 14½ | 14 | 14½ | 14½ | 15½ | 14⅜ | 16⅛ | 15½ |
| 1891..... | 15 | 14⅜ | 14⅞ | 14½ | 14½ | 13⅜ | 13⅛ | 13½ | 13⅛ | 12⅛ | 13 | 12⅞ |
| 1892..... | 11 | 10⅛ | 10⅛ | 10½ | 12 | 10⅛ | 12 | 11⅛ | 12½ | 12 | 11⅞ | 11⅜ |
| 1893..... | 12½ | 12½ | 12½ | 12 | 12 | 11⅛ | 11½ | 11½ | 18⅛ | 11 | 11 | 10⅛ |
| 1894..... | 10½ | 10 | 10 | 9⅜ | 9⅜ | 9⅜ | 9½ | 9⅜ | 9⅜ | 9½ | 9½ | 9 |
| 1895..... | 10 | 9⅞ | 9⅞ | 9½ | 9½ | 9½ | 9⅛ | 9⅜ | 10⅜ | 9⅛ | 10⅛ | 10½ |
| 1896..... | 10½ | 9⅛ | 11½ | 10 | 11½ | 10⅞ | 11 | 10⅛ | 11½ | 10⅞ | 11⅛ | 11½ |
| 1897..... | 12 | 11½ | 12 | 11⅞ | 11⅞ | 11½ | 11½ | 11 | 11⅜ | 10⅛ | 11⅜ | 10⅞ |

*Highest and lowest prices of Lake Superior ingot copper, by months, etc.*—Continued.

[Cents per pound.]

| Year. | July. | | August. | | September. | | October. | | November. | | December. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1860..... | 21⅜ | 21⅛ | 21⅛ | 21⅛ | 22 | 21⅛ | 22 | 21⅛ | 21⅛ | 20⅛ | 20⅛ | 19⅜ |
| 1861..... | 18 | 17⅛ | 19 | 17⅜ | 20⅛ | 19 | 20⅛ | 20 | 22⅛ | 20⅛ | 27 | 22⅛ |
| 1862..... | 24⅛ | 22⅛ | 24⅛ | 24 | 27 | 24⅛ | 32⅞ | 27 | 32⅞ | 30⅛ | 31⅛ | 30⅛ |
| 1863..... | 32 | 29 | 31 | 29 | 32⅛ | 31 | 34⅛ | 32⅛ | 38⅛ | 34⅛ | 38⅜ | 38⅛ |
| 1864..... | 55 | 49 | 52⅛ | 50 | 52⅛ | 47⅛ | 48 | 47 | 49 | 47 | 50 | 48⅛ |
| 1865..... | 30⅛ | 28 | 32 | 30⅛ | 32⅜ | 31⅛ | 33 | 32⅛ | 45⅛ | 33 | 45⅛ | 39⅛ |
| 1866..... | 33⅛ | 31 | 31 | 30 | 31⅛ | 30⅜ | 31 | 30⅜ | 30⅜ | 26⅛ | 29 | 26⅛ |
| 1867..... | 26 | 24 | 26⅛ | 25⅜ | 27⅛ | 26⅛ | 26⅜ | 22⅜ | 23 | 22⅜ | 23 | 21⅛ |
| 1868..... | 24⅛ | 23⅛ | 24⅛ | 24 | 24 | 23⅜ | 24 | 23 | 24 | 22⅛ | 24⅛ | 23⅜ |
| 1869..... | 22⅛ | 21⅞ | 23⅛ | 21⅞ | 23 | 22 | 22⅜ | 22 | 22⅛ | 22 | 22 | 21⅛ |
| 1870..... | 20⅛ | 20⅜ | 21⅜ | 20⅛ | 21⅛ | 20⅜ | 21⅜ | 21⅛ | 23⅜ | 21⅜ | 22⅜ | 22⅛ |
| 1871..... | 22⅛ | 21⅜ | 23 | 22⅜ | 23⅞ | 22⅞ | 23⅞ | 23⅛ | 24⅛ | 23⅛ | 27 | 24⅛ |
| 1872..... | 34 | 33 | 35 | 32⅛ | 35⅛ | 33 | 34⅜ | 31⅛ | 32⅛ | 30⅜ | 32⅛ | 30⅛ |
| 1873..... | 29 | 26⅜ | 27⅛ | 27 | 27 | 25⅛ | 25⅛ | 24 | 24 | 21 | 25 | 23 |
| 1874..... | 24⅛ | 20 | 21 | 19 | 21⅛ | 21 | 22⅛ | 21⅛ | 23⅜ | 22⅛ | 23⅛ | 23⅛ |
| 1875..... | 23 | 22⅜ | 23⅜ | 23 | 23⅞ | 23⅛ | 23⅛ | 23 | 23⅛ | 23 | 23⅜ | 23⅜ |
| 1876..... | 20 | 19⅛ | 19⅛ | 18⅜ | 21 | 18⅜ | 21⅛ | 20⅛ | 20⅛ | 20 | 20 | 19⅜ |
| 1877..... | 19⅛ | 19 | 19 | 17⅞ | 18⅛ | 17⅞ | 18 | 17⅜ | 17⅜ | 17⅜ | 17⅜ | 17⅛ |
| 1878..... | 16⅛ | 16 | 16 | 16 | 16⅛ | 16 | 16 | 15⅛ | 15⅞ | 15⅛ | 16 | 15⅞ |
| 1879..... | 16⅛ | 16 | 16⅜ | 16 | 17 | 16⅛ | 21⅛ | 18 | 21⅜ | 21 | 21⅛ | 21 |
| 1880..... | 18⅞ | 18⅛ | 19⅛ | 19 | 18⅞ | 18⅜ | 18⅞ | 18⅜ | 18⅞ | 18⅜ | 19⅛ | 18⅞ |
| 1881..... | 16⅛ | 16 | 16⅜ | 16⅜ | 18⅛ | 16⅜ | 18⅜ | 18 | 19 | 18⅛ | 20⅜ | 19⅛ |
| 1882..... | 18⅛ | 18⅛ | 18⅛ | 18⅛ | 18⅛ | 18 | 18⅛ | 18 | 18⅛ | 18 | 18 | 17⅞ |
| 1883..... | 15⅛ | 15 | 15 | 15 | 15⅛ | 15⅛ | 15⅛ | 15⅛ | 15 | 14⅞ | 15 | 14⅞ |
| 1884..... | 14⅛ | 13⅞ | 14 | 13⅞ | 13⅛ | 13 | 13⅛ | 12⅞ | 13 | 12⅛ | 12⅛ | 11 |
| 1885..... | 11⅛ | 10⅞ | 11⅛ | 11 | 11⅛ | 10 11/20 | 11⅛ | 10⅞ | 11⅛ | 10⅞ | 11⅛ | 11 1/10 |
| 1886..... | 10⅛ | 10 | 10⅛ | 10 | 11⅛ | 10⅛ | 11⅜ | 11⅛ | 12 | 11⅜ | 12⅛ | 11⅞ |
| 1887..... | 10⅜ | 10⅛ | 10⅜ | 10⅜ | 11 | 10⅜ | 12 3/20 | 10 3/10 | 14 11/20 | 11 11/20 | 17⅜ | 14 19/20 |
| 1888..... | 16 9/10 | 16 13/20 | 17 | 16⅜ | 17 7/10 | 16 9/10 | 17⅜ | 17 7/20 | 17⅜ | 17⅛ | 17 9/20 | 17 1/10 |
| 1889..... | 12 | 12 | 12 | 12 | 12 | 11 | 11 | 11 | 13⅛ | 11⅛ | 14⅛ | 14 |
| 1890..... | 17⅛ | 16⅛ | 17⅛ | 17 | 17 | 17 | 16⅞ | 16⅜ | 16⅜ | 16⅜ | 16 | 15 |
| 1891..... | 12⅞ | 12⅛ | 12⅜ | 12 | 12⅛ | 12⅛ | 12⅜ | 11⅜ | 11⅛ | 11 | 11⅛ | 10⅛ |
| 1892..... | 11⅜ | 11⅛ | 11⅜ | 11 6/10 | 11 6/20 | 11 1/20 | 11⅜ | 11 1/20 | 12 | 11⅜ | 12⅜ | 12⅛ |
| 1893..... | 10⅛ | 10⅛ | 10⅛ | 9⅜ | 9⅞ | 9⅜ | 9⅜ | 9⅜ | 10⅛ | 9⅜ | 10⅛ | 10⅜ |
| 1894..... | 9⅛ | 9 | 9⅛ | 9 | 9⅞ | 9⅛ | 9⅜ | 9⅛ | 9⅛ | 9⅜ | 10 | 9⅛ |
| 1895..... | 11⅜ | 10⅛ | 12⅛ | 11⅜ | 12⅛ | 12 | 12 | 11⅜ | 11⅜ | 11 | 11 | 10 |
| 1896..... | 11⅜ | 11 | 11⅛ | 10⅞ | 10⅞ | 10⅜ | 10⅞ | 10⅛ | 11⅛ | 10⅞ | 11⅛ | 11⅛ |
| 1897..... | 11⅛ | 11 | 11⅛ | 11 | 11⅜ | 11⅛ | 11⅛ | 11 | 11 | 10⅜ | 11 | 10⅞ |

The following table shows the fluctuations in prices in the English market:

*Average values of copper in England.*

| Year. | Chile bars or G. O. B. | | | Ore, 25 per cent. | | Precipitate. | |
|---|---|---|---|---|---|---|---|
| | *Long tons.* | | | *Per unit.* | | *Per unit.* | |
| | £ | s. | d. | s. | d. | s. | d. |
| 1880 | 62 | 10 | 0 | 12 | 9 | 12 | 11 |
| 1881 | 61 | 10 | 0 | 12 | 6 | 13 | 8 3/16 |
| 1882 | 66 | 17 | 0 | 13 | 6½ | 13 | 10 1/16 |
| 1883 | 63 | 5 | 10 | 12 | 4½ | 12 | 10 1/16 |
| 1884 | 54 | 9 | 1 | 10 | 5½ | 11 | 1 |
| 1885 | 44 | 0 | 10 | 8 | 4 | 9 | 0½ |
| 1886 | 40 | 9 | 3 | 7 | 9 | 8 | 3½ |
| 1887 | 43 | 16 | 11 | 8 | 6 | 8 | 11½ |
| 1888 | 79 | 19 | 4½ | 14 | 3½ | 16 | 3 |
| 1889 | 49 | 10 | 5 | 9 | 6½ | ..... | |
| 1890 | 54 | 5 | 5 | 10 | 7 | ..... | |
| 1891 | 51 | 9 | 8½ | 9 | 7 | ..... | |
| 1892 | 45 | 12 | 8½ | 8 | 7 | ..... | |
| 1893 | 43 | 15 | 6½ | 8 | 5 | ..... | |
| 1894 | 40 | 7 | 4 | 7 | 6½ | ..... | |
| 1895 | 42 | 19 | 7 | 8 | 4½ | ..... | |
| 1896 | 46 | 18 | 1½ | 9 | 1 | ..... | |
| 1897 | 49 | 2 | 6½ | 9 | 5 | ..... | |

In detail the fluctuations, monthly, of good merchant copper in the English market were as follows in 1894, 1895, 1896, and 1897:

*Fluctuations in good merchant copper in England in 1894, 1895, 1896, and 1897.*

[Per long ton.]

| Month. | 1894. | | | 1895. | | | 1896. | | | 1897. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| January | 42 | 1 | 6½ | 40 | 13 | 9½ | 41 | 13 | 8½ | 50 | 10 | 8½ |
| February | 41 | 6 | 8½ | 39 | 14 | 3½ | 44 | 16 | 11½ | 51 | 6 | 6 |
| March | 40 | 19 | 5½ | 39 | 1 | 9½ | 45 | 8 | 0½ | 50 | 4 | 0½ |
| April | 40 | 10 | 10½ | 40 | 3 | 6½ | 45 | 3 | 2½ | 48 | 16 | 9 |
| May | 39 | 10 | 5½ | 43 | 0 | 0 | 46 | 6 | 6 | 48 | 10 | 11½ |
| June | 38 | 10 | 4½ | 42 | 15 | 6½ | 48 | 18 | 0 | 49 | 1 | 1½ |
| July | 38 | 12 | 8½ | 44 | 0 | 2½ | 49 | 3 | 7½ | 48 | 1 | 0½ |
| August | 39 | 12 | 4½ | 46 | 13 | 2½ | 47 | 16 | 9½ | 48 | 12 | 10½ |
| September | 41 | 1 | 0 | 46 | 15 | 7½ | 47 | 18 | 7½ | 49 | 8 | 5 |
| October | 41 | 2 | 10½ | 46 | 4 | 10 | 47 | 11 | 7 | 48 | 10 | 3 |
| November | 40 | 3 | 2½ | 43 | 16 | 3½ | 49 | 3 | 11 | 48 | 0 | 11½ |
| December | 40 | 16 | 5½ | 42 | 15 | 11 | 48 | 16 | 9½ | 48 | 7 | 0½ |

The year opened with Lake copper firm and quiet at 11½ cents per pound, but under a heavy export business the market strengthened, prices advancing toward the close of January to 12 cents per pound, at which price consumers covered about one month's requirements. London did a heavy business during the month, the sales aggregating 25,000 tons. Prices rose from £49 10s. for G. M. B. to £51 15s., but subsequently declined to £50 16s. 3d. Domestic consumers being supplied, the London market controlled the situation in February, advancing to £51 11s. 3d. Early in the month a decline to £50 8s. 9d. followed, during the second week, from which there was an advance in a few days to £51 13s. 9d., the month closing at £51. In the meantime our domestic market was dull at the prevailing quotation of 11⅞ cents. March developed considerable weakness, and concessions were made which ultimately carried the market down to 11½ cents, the London market falling off to £48 12s. 6d. This movement continued under a much more considerable business during April, the Lake copper price receding to 11 cents and the London G. M. B. reaching £48.

Early in May considerable lots were sold by leading Lake interests, for June delivery, to home consumers at the reported price of 11 cents. Still the spot market continued weak, reaching 10¾ cents toward the middle of the month, there having been heavy offerings in London, too, which eased the market to £47 1s. 3d. Then, under a large business at home and abroad, came a sharp reaction, New York going up to 11⅛ cents, while London reached £49, from which it receded, however, toward the close of the month to £48 13s. 9d. June opened quietly, and showed an easing tendency until quite heavy domestic and export sales caused a recovery to 11⅛ cents, which was lost, however, in July. The event of that month was the beginning of the engineers' strike in England, which caused a decline there, since it interfered with consumption and diverted trade to other countries. Prices declined to £47 11s. 3d., from which, however, there was partial recovery. August was a month of repeated and heavy domestic and export sales, which created a strong feeling and led to an advance of 11¼ cents, London reaching £49 2s. 6d. Aside from a good export demand, September was a quiet month, the market reaching 11⅜ cents. October found offerings freer, the market easing, until at the close of the month considerable export sales were effected on the basis of 11 cents for Lake, London declining to £48. November was dull, with increasing pressure to sell on both sides of the Atlantic, so that Lake copper reached 10¾ cents and London fell off to £47 8s. 9d. December brought large transactions with home consumers for the first three months of 1898 at 11 cents per pound and stiffened the market.

## THE WORLD'S PRODUCTION.

Messrs. Henry R. Merton & Co., of London, have compiled the following statement of the world's production, the figures being modified by this office where official statistics are available:

*The copper production of the world, 1889 to 1897, inclusive.*

[Long tons.]

| Country. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|
| EUROPE. | | | | |
| Great Britain | 905 | 935 | 720 | 495 |
| Spain and Portugal: | | | | |
| Rio Tinto | 29,500 | 30,000 | 31,827 | 31,539 |
| Tharsis | *a* 11,000 | *a* 10,300 | *a* 11,100 | 11,258 |
| Mason and Barry | *a* 5,250 | *a* 5,600 | *a* 4,150 | *a* 4,400 |
| Sevilla | 1,350 | 810 | 875 | 1,070 |
| Other mines | *a* 7,170 | *a* 4,790 | *a* 6,390 | *a* 7,992 |
| Germany: | | | | |
| Mansfield | 15,506 | 15,800 | 14,250 | 15,360 |
| Other German | *a* 1,850 | 1,825 | 1,900 | 1,935 |
| Austria | 1,225 | 1,210 | 1,016 | 823 |
| Hungary | *a* 300 | *a* 300 | 285 | 285 |
| Sweden | 830 | 830 | 655 | 735 |
| Norway | 1,357 | 1,390 | 1,247 | 1,410 |
| Italy | 1,300 | 1,362 | 1,536 | 2,523 |
| Russia | 4,070 | 4,800 | 4,800 | 4,823 |
| Total Europe | 81,613 | 79,952 | 80,751 | 84,648 |
| NORTH AMERICA. | | | | |
| United States | 101,239 | 115,966 | 126,839 | 154,072 |
| Canada | 3,040 | 2,685 | 3,986 | 3,164 |
| Newfoundland | 2,615 | 1,735 | 2,040 | 2,390 |
| Mexico: | | | | |
| Boleo | 3,280 | 3,450 | 4,175 | 6,415 |
| Other Mexican | 500 | 875 | 1,025 | 900 |
| Total North America | 110,674 | 124,711 | 138,065 | 166,941 |
| SOUTH AMERICA. | | | | |
| Chile | 24,250 | 26,120 | 19,875 | 22,565 |
| Bolivia: | | | | |
| Corocoro | *a* 1,200 | 1,900 | 2,150 | 2,860 |
| Peru | 275 | 150 | 280 | 290 |
| Venezuela: | | | | |
| New Quebrada | 6,068 | 5,640 | 6,500 | 3,100 |
| Argentina | 190 | 150 | 210 | 200 |
| Total South America | 31,983 | 33,960 | 29,015 | 29,015 |

*a* Estimated.

*The copper production of the world, 1889 to 1897, inclusive*—Continued.

[Long tons.]

| Country. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|
| AFRICA. | | | | |
| Algiers | 160 | 120 | 120 | ..... |
| Cape of Good Hope: | | | | |
| Cape Company | a7,700 | 5,000 | 5,100 | 5,670 |
| Namaqua | | 1,450 | 900 | 450 |
| Total Africa | 7,860 | 6,570 | 6,120 | 6,120 |
| ASIA. | | | | |
| Japan | 16,125 | 17,972 | 18,500 | 19,000 |
| Total Asia | 16,125 | 17,972 | 18,500 | 19,000 |
| AUSTRALIA. | | | | |
| New South Wales | 4,082 | 3,455 | 4,192 | 4,185 |
| South Australia | 7,500 | 6,000 | 6,100 | 4,600 |
| Total Australia | 11,582 | 9,455 | 10,292 | 8,785 |

| Country. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| EUROPE. | | | | | |
| Great Britain | 425 | 5 | 580 | 555 | a550 |
| Spain and Portugal: | | | | | |
| Rio Tinto | 31,954 | 31,061 | 32,985 | 34,501 | 33,923 |
| Tharsis | 11,000 | 11,000 | 12,000 | 12,000 | 12,000 |
| Mason and Barry | a4,400 | a4,200 | a4,100 | a3,900 | a4,300 |
| Sevilla | 1,270 | 1,170 | 1,050 | 1,025 | 810 |
| Other mines | 6,225 | 4,805 | 4,300 | 3,400 | 3,050 |
| Germany: | | | | | |
| Mansfield | 14,150 | 14,990 | 14,860 | 18,265 | 17,960 |
| Other German | 2,000 | 2,210 | 1,695 | 1,800 | 2,185 |
| Austria | 1,211 | 1,781 | 869 | 1,065 | 1,210 |
| Hungary | 210 | 310 | 239 | 205 | 445 |
| Sweden | 535 | 350 | 203 | 500 | 545 |
| Norway | 1,860 | 1,885 | 2,685 | a2,500 | 3,450 |
| Italy | 2,333 | 2,629 | 2,236 | 3,400 | 3,400 |
| Russia | 5,349 | 5,638 | 5,326 | 5,100 | a5,000 |
| Total Europe | 82,922 | 82,474 | 83,128 | 88,216 | 88,828 |

a Estimated.

*The copper production of the world, 1889 to 1897, inclusive*—Continued.

[Long tons.]

| Country. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| NORTH AMERICA. | | | | | |
| United States | 147,033 | 158,120 | 169,917 | 205,384 | 220,571 |
| Canada | a1,000 | 1,204 | 3,923 | 4,190 | 5,938 |
| Newfoundland | 2,040 | 1,900 | 1,800 | 1,800 | 1,800 |
| Mexico: | | | | | |
| Boleo | 7,980 | 10,370 | 10,450 | 9,940 | 10,170 |
| Other Mexican | 500 | 1,400 | 1,170 | 1,210 | a1,200 |
| Total North America | 158,553 | 172,994 | 187,260 | 222,524 | 239,679 |
| SOUTH AMERICA. | | | | | |
| Chile | 21,350 | 21,340 | 22,075 | 23,500 | 21,900 |
| Bolivia: | | | | | |
| Corocoro | 2,500 | 2,300 | 2,250 | 2,000 | 2,200 |
| Peru | 460 | 440 | 450 | 740 | 1,000 |
| Venezuela: | | | | | |
| New Quebrada | 2,850 | 2,500 | ..... | ..... | ..... |
| Argentina | 160 | 230 | 150 | 100 | 200 |
| Total South America | 27,220 | 26,810 | 24,925 | 26,340 | 25,300 |
| AFRICA. | | | | | |
| Algiers | ..... | ..... | 35 | ..... | ..... |
| Cape of Good Hope: | | | | | |
| Cape Company | 5,200 | 5,000 | 5,350 | 5,470 | 5,290 |
| Namaqua | 890 | 1,500 | 1,730 | 1,980 | 2,150 |
| Total Africa | 6,090 | 6,500 | 7,115 | 7,450 | 7,440 |
| ASIA. | | | | | |
| Japan | 18,000 | 20,050 | 18,430 | 21,000 | 23,000 |
| Total Asia | 18,000 | 20,050 | 18,430 | 21,000 | 23,000 |
| AUSTRALIA. | | | | | |
| New South Wales | 1,558 | 1,847 | 3,322 | 4,467 | a4,600 |
| South Australia | 4,600 | 4,944 | 5,251 | 5,430 | a5,600 |
| Tasmania | ..... | ..... | ..... | a1,000 | a4,800 |
| Total Australia | 6,158 | 6,791 | 8,573 | 10,897 | 15,000 |

a Estimated.

*The copper production of the world, 1889 to 1897, inclusive*—Continued.

RECAPITULATION.

[Long tons.]

| Country. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|
| Europe | 81,613 | 79,952 | 80,751 | 84,648 |
| North America | 110,674 | 124,711 | 138,065 | 166,941 |
| South America | 31,983 | 33,960 | 29,015 | 29,015 |
| Africa | 7,860 | 6,570 | 6,120 | 6,120 |
| Asia | 16,125 | 17,972 | 18,500 | 19,000 |
| Australia | 11,582 | 9,455 | 10,292 | 8,785 |
| Total | 259,837 | 272,620 | 282,713 | 314,509 |

| Country. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Europe | 88,922 | 82,474 | 83,128 | 88,216 | 88,828 |
| North America | 158,553 | 172,994 | 187,260 | 222,524 | 239,679 |
| South America | 27,220 | 26,810 | 24,925 | 26,340 | 25,300 |
| Africa | 6,090 | 6,500 | 7,115 | 7,450 | 7,440 |
| Asia | 18,000 | 20,050 | 18,430 | 21,000 | 23,000 |
| Australia | 6,158 | 6,791 | 8,573 | 10,897 | 15,000 |
| Total | 304,943 | 315,619 | 329,431 | 376,427 | 399,247 |

Since 1889 the world's production has increased by 139,410 long tons, of which there are to the credit of the United States 119,005 long tons.

## THE ENGLISH COPPER TRADE.

Since England is one of the leading copper markets of the world, the following tables, showing the import and export movement, are of great interest:

*British imports and exports of copper.*

[Long tons.]

| Year. | Imports of— | | Total imports. | Exports. | Apparent English consumption. |
|---|---|---|---|---|---|
| | Bars, cakes, and ingots. | Copper in ores and furnace products. | | | |
| 1860 | 13,142 | 13,715 | 26,857 | 26,117 | ..... |
| 1865 | 23,137 | 23,922 | 47,059 | 41,398 | ..... |
| 1870 | 30,724 | 27,025 | 57,749 | 53,006 | ..... |
| 1871 | 33,228 | 23,671 | 56,899 | 56,633 | ..... |
| 1872 | 49,000 | 21,702 | 70,702 | 53,195 | ..... |
| 1873 | 35,840 | 26,756 | 62,596 | 55,716 | ..... |
| 1874 | 39,906 | 27,894 | 67,800 | 59,742 | ..... |
| 1875 | 41,931 | 29,483 | 71,414 | 51,870 | ..... |
| 1876 | 39,145 | 36,191 | 75,336 | 52,468 | ..... |
| 1877 | 39,743 | 53,582 | 93,325 | 54,088 | ..... |
| 1878 | 39,360 | 48,212 | 87,572 | 55,001 | ..... |
| 1879 | 46,670 | 50,421 | 97,091 | 62,412 | 30,774 |
| 1880 | 36,509 | 56,225 | 92,734 | 59,482 | 32,879 |
| 1881 | 32,170 | 54,057 | 86,227 | 61,689 | 31,607 |
| 1882 | 35,509 | 58,366 | 93,875 | 55,683 | 42,877 |
| 1883 | 35,653 | 63,493 | 99,146 | 59,350 | 40,469 |
| 1884 | 39,767 | 69,623 | 109,390 | 64,691 | 51,263 |
| 1885 | 41,933 | 81,616 | 123,549 | 62,080 | 54,323 |
| 1886 | 42,969 | 65,046 | 108,015 | 60,511 | 41,158 |
| 1887 | 29,198 | 73,891 | 103,089 | 69,453 | 53,096 |
| 1888 | 44,063 | 90,867 | 135,470 | *a* 72,066 | 42,562 |
| 1889 | *b* 38,576 | 101,407 | 139,983 | 75,627 | 65,759 |
| 1890 | *c* 49,461 | 91,788 | 141,249 | 89,747 | 66,170 |
| 1891 | 44,213 | 94,403 | 138,616 | 76,056 | 59,223 |
| 1892 | *d* 35,015 | 99,356 | 134,371 | 82,542 | *e* 48,367 |
| 1893 | 41,829 | 88,003 | 129,832 | 70,986 | 66,817 |
| 1894 | 56,158 | 68,851 | 125,009 | 54,689 | 61,330 |
| 1895 | 42,135 | 77,806 | 119,941 | 65,990 | 62,692 |
| 1896 | 60,458 | 75,398 | 135,856 | 59,334 | 89,191 |
| 1897 | 60,428 | 76,127 | 136,555 | 56,542 | 84,631 |

*a* Including 22,557 tons of Chile bars transferred to France.
*b* Including 1,166 tons of Chile bars transferred from France to England.
*c* Including 3,501 tons of Chile bars transferred from France to England.
*d* Including 3,585 tons of Chile bars transferred from France to England.
*e* Add 4,001 tons for comparison with former years, the difference arising from the new method of making up stock.

The following figures from the board of trade returns, supplemented by Messrs. James Lewis & Son, of Liverpool, for the past ten years show in detail the form in which the copper is brought into Great Britain and in what form it is exported:

*Imports of copper into Great Britain from 1888 to 1897, inclusive.*

[Long tons.]

| Character. | 1888. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|---|
| Pure in pyrites | 15,448 | 16,097 | 16,422 | 15,406 | 15,110 |
| Pure in precipitate | 26,366 | 25,110 | 25,563 | 29,326 | 28,444 |
| Pure in ore | 19,452 | 22,219 | 18,000 | 14,172 | 13,585 |
| Pure in matte | 29,601 | 37,981 | 31,803 | 35,499 | 42,217 |
| Bars, cakes, etc | 44,603 | 38,576 | 49,461 | 44,213 | 35,015 |
| Total | 135,470 | 139,983 | 141,249 | 138,616 | 134,371 |

| Character. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Pure in pyrites | 15,320 | 15,401 | 14,561 | 14,726 | 15,576 |
| Pure in precipitate | 24,988 | 24,878 | 26,508 | 23,160 | 25,932 |
| Pure in ore | 11,701 | 12,804 | 15,240 | 12,499 | 11,980 |
| Pure in matte | 35,994 | 15,767 | 21,497 | 25,013 | 22,639 |
| Bars, cakes, etc | 41,829 | 56,158 | 42,135 | 60,458 | 60,428 |
| Total | 129,832 | 125,008 | 119,941 | 135,856 | 136,555 |

The following table gives the details relating to the British imports of precipitate and matte:

*Imports of precipitate and matte into Great Britain from 1888 to 1897, inclusive.*

[Long tons.]

| Country. | Fine copper. | | | | |
|---|---|---|---|---|---|
| | 1888. | 1889. | 1890. | 1891. | 1892. |
| Portugal, Spain | 30,119 | 28,157 | 28,018 | 32,425 | 32,509 |
| Chile | 734 | 1,919 | 2,122 | 595 | 2,040 |
| United States | 20,752 | 26,581 | 18,897 | 19,109 | 24,668 |
| Other countries | 4,362 | 6,434 | 8,329 | 12,696 | 11,444 |
| Total | 55,967 | 63,091 | 57,366 | 64,825 | 70,661 |

*Imports of precipitate and matte into Great Britain from 1888 to 1897, etc.*—Continued.

[Long tons.]

| Country. | Fine copper. | | | | |
|---|---|---|---|---|---|
| | 1893. | 1894. | 1895. | 1896. | 1897. |
| Portugal and Spain | 29,359 | 28,645 | 30,196 | 28,596 | 32,821 |
| Chile | 2,714 | 626 | 212 | 797 | 2,233 |
| United States | 20,700 | 2,133 | 8,337 | 10,016 | 5,259 |
| Other countries | 8,209 | 9,242 | 9,660 | 8,764 | 8,258 |
| Total | 60,982 | 40,646 | 48,405 | 48,173 | 48,571 |

Messrs. James Lewis & Son, of Liverpool, estimate as follows the imports of copper product in Liverpool, London, and Swansea during the years from 1887 to 1897, which represent the total imports, with the exception of precipitate, into Newcastle and Cardiff, reliable returns of which can not be obtained, but which was estimated to vary from 8,000 to 10,000 tons fine per annum in former years, and in the last few years has been placed as high as 12,000 tons:

*Imports of copper product into Liverpool, Swansea, and London.*

[Long tons.]

| Country. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|
| Chile | 20,008 | 24,479 | 22,070 | 22,909 | 14,378 |
| United States | 16,534 | 25,730 | 30,729 | 20,171 | 26,120 |
| Spain and Portugal | 5,178 | 5,915 | 5,189 | 5,202 | 4,734 |
| Spain and Portugal (precipitate) | 13,042 | 15,568 | 17,192 | 18,430 | 17,439 |
| Spain and Portugal (pyrites) | 14,940 | 15,448 | 16,097 | 16,422 | 15,406 |
| Australia | 6,047 | 6,746 | 6,285 | 6,561 | 6,265 |
| Cape of Good Hope | 8,271 | 8,829 | 11,507 | 9,927 | 7,452 |
| Venezuela | 2,261 | 3,574 | 4,299 | 5,245 | 5,017 |
| Japan | 200 | 4,469 | 2,523 | 10,674 | 7,852 |
| Italy | 1,055 | 1,058 | 1,043 | 953 | 649 |
| Norway | ..... | 545 | 234 | 80 | 30 |
| Canada | 94 | 156 | 181 | 264 | 189 |
| Newfoundland | 359 | 465 | 631 | 1,552 | 1,617 |
| Mexico | 61 | 158 | 3,938 | 3,325 | 3,616 |
| Peru | 13 | 202 | 271 | 254 | 279 |
| River Plate | 167 | 135 | 184 | 143 | 211 |
| Other countries | 1,074 | 4,054 | 1,389 | 225 | 236 |
| Total tons fine | 89,304 | 117,531 | 123,762 | 122,337 | 111,490 |

*Imports of copper product into Liverpool, Swansea, and London*—Continued.

[Long tons.]

| Country. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| Chile | 17,619 | 15,875 | 16,971 | 18,197 | 15,923 | 14,982 |
| United States | 26,475 | 35,647 | 30,495 | 17,098 | 39,676 | 32,792 |
| Spain and Portugal | 5,372 | 5,674 | 4,674 | 3,288 | 6,298 | 7,697 |
| Spain and Portugal (precipitate) | 14,831 | 10,296 | 10,642 | 12,612 | 11,474 | 17,386 |
| Spain and Portugal (pyrites) | 15,110 | 15,320 | 15,401 | 14,561 | 14,726 | 15,576 |
| Australia | 5,547 | 6,293 | 6,481 | 8,223 | 10,635 | 10,218 |
| Cape of Good Hope | 8,092 | 5,472 | 6,112 | 6,524 | 5,905 | 7,575 |
| Venezuela | 5,028 | 1,434 | 2,327 | 360 | 107 | 21 |
| Japan | 4,989 | 2,370 | 3,299 | 4,258 | 3,492 | 3,654 |
| Italy | 725 | 1,091 | 763 | 283 | 418 | 100 |
| Norway | 38 | ..... | 30 | 486 | 528 | 130 |
| Canada | 120 | 50 | 105 | ..... | ..... | 127 |
| Newfoundland | 3,229 | 2,265 | 1,279 | 3,244 | 2,467 | 2,484 |
| Mexico | 869 | 1,185 | 1,408 | 4,623 | 7,792 | 6,217 |
| Peru | 287 | 462 | 443 | 449 | 741 | 998 |
| River Plate | 196 | 160 | 229 | 148 | 94 | 190 |
| Other countries | 1,245 | 1,944 | 855 | 930 | 797 | 1,613 |
| Total tons fine | 109,772 | 105,638 | 101,514 | 95,284 | 121,073 | 121,760 |

The quantities of copper in different forms which were imported from the United States to Great Britain and France are given in the following table:

*Imports of copper from the United States into England and France.*

[Long tons.]

| Country. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|
| England: | | | | | |
| Ore | 26 | 298 | 349 | 5 | 4 |
| Matte | 15,039 | 20,752 | 26,581 | 18,897 | 19,109 |
| Bars and ingots | 1,469 | 4,680 | 3,799 | 1,269 | 7,007 |
| Total | 16,534 | 25,730 | 30,729 | 20,171 | 26,120 |
| France | 3,910 | 6,496 | 1,058 | 1,733 | 8,329 |
| United States into England and France | 20,444 | 32,226 | 31,787 | 21,904 | 34,449 |
| Chile into England and France | 29,019 | 32,947 | 22,020 | 24,641 | 18,820 |

| Country. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| England: | | | | | | |
| Ore | 18 | 23 | 5 | ..... | ..... | ..... |
| Matte | 24,668 | 20,700 | 2,133 | 8,337 | 10,016 | 5,259 |
| Bars and ingots | 1,427 | 14,924 | 28,357 | 12,250 | 29,780 | 27,591 |
| Total | 26,113 | 35,647 | 30,495 | 20,587 | 39,796 | 32,850 |
| France | 4,340 | 12,483 | 9,248 | 11,806 | 21,998 | 26,165 |
| United States into England and France | 30,453 | 48,130 | 39,743 | 32,393 | 61,794 | 59,015 |
| Chile into England and France | 19,840 | 19,717 | 20,783 | 22,161 | 22,593 | 20,842 |

The exports of copper from Great Britain, estimating the fine contents of alloys, were as follows:

*Exports of copper from Great Britain from 1888 to 1897, inclusive*

[Long tons.]

| Character. | 1888. | 1889. | 1890. | 1891 | 1892. |
|---|---|---|---|---|---|
| English, wrought and unwrought, and sheets | 32,058 | 48,189 | 58,571 | 51,765 | 58,518 |
| Yellow metal, at 60 per cent | 4,513 | 9,195 | 10,514 | 8,547 | 8,853 |
| Brass, at 70 per cent | 2,650 | 3,773 | 3,721 | 3,992 | 3,783 |
| Total | 39,221 | 61,157 | 72,806 | 64,304 | 71,154 |
| Fine foreign | a 32,845 | 14,470 | 16,941 | 11,752 | 11,388 |
| Total | 72,066 | 75,627 | 89,747 | 76,056 | 82,542 |

| Character. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| English, wrought and unwrought, and sheets | 45,349 | 34,874 | 45,299 | 38,734 | 35,951 |
| Yellow metal, at 60 per cent | 8,745 | 9,514 | 8,978 | 6,773 | 6,609 |
| Brass, at 70 per cent | 4,049 | 3,808 | 3,747 | 4,172 | 3,936 |
| Total | 58,143 | 48,196 | 58,024 | 49,679 | 46,496 |
| Fine foreign | 12,843 | 6,493 | 7,966 | 9,655 | 10,046 |
| Total | 70,986 | 54,689 | 65,990 | 59,334 | 56,542 |

a Including 22,557 tons Chile bars transferred to France.

## THE FRENCH COPPER TRADE.

The direct imports of copper from different countries into France were as follows for a series of years, according to Messrs. James Lewis & Son:

*Direct imports into France from 1887 to 1897, inclusive.*

[Long tons.]

| Year. | Chile. | United States. | Mexico. | Other countries. | Total. |
|---|---|---|---|---|---|
| 1887 | 9,011 | 3,910 | ..... | 1,048 | 13,969 |
| 1888 | 8,468 | 6,496 | 2,700 | 6,905 | 24,569 |
| 1889 | 2,470 | 1,058 | 738 | 1,715 | 5,981 |
| 1890 | 2,803 | 1,733 | ..... | 975 | 5,511 |
| 1891 | 4,442 | 8,329 | ..... | 2,118 | 14,889 |
| 1892 | 2,221 | 4,340 | 2,515 | 2,208 | 11,284 |
| 1893 | 3,842 | 12,483 | 7,620 | 2,908 | 26,853 |
| 1894 | 3,812 | 9,248 | 6,299 | 1,588 | 20,947 |
| 1895 | 3,964 | 11,806 | 4,520 | 2,505 | 22,795 |
| 1896 | 7,030 | 21,998 | 3,627 | 3,700 | 36,355 |
| 1897 | 4,806 | 26,165 | 5,677 | 2,557 | 39,205 |

According to the French official statistics, the imports of bars, ingots, etc., were as follows:

*Imports of copper into France.*

[Metric tons.]

| Source. | 1895. | 1896. | 1897. |
|---|---|---|---|
| England | 8,250 | 5,596 | 3,884 |
| Chile | 3,494 | 4,573 | 2,804 |
| United States | 11,157 | 21,279 | 28,118 |
| Other countries | 11,717 | 12,197 | 14,830 |
| Total | 34,618 | 43,645 | 49,636 |

A comparison shows that there are striking discrepancies between the statistics collected by Messrs. James Lewis & Son and the official returns, which it seems difficult to harmonize. Messrs. Aron Hirsch & Sohn, of Halberstadt, Germany, in the annual statistical report, present the following as drawn from official sources:

*French imports and exports of copper.*

[Metric tons.]

| | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Imports of bars, ingots, etc..... | 30,398 | 28,654 | 34,618 | 43,646 | 49,636 |
| Deduct exports..... | 7,019 | 5,322 | 4,910 | 5,144 | 4,768 |
| | 23,379 | 23,332 | 29,708 | 38,502 | 44,868 |
| Add old copper, excess of imports over exports..... | 2,892 | 2,411 | 4,644 | 5,524 | 5,192 |
| Balance imports..... | 26,271 | 25,743 | 34,352 | 44,026 | 50,060 |

*Imports and exports of ores, matte, etc.*

[Metric tons.]

| | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Imports..... | 20,543 | 11,643 | 10,448 | 9,216 | 12,408 |
| Exports..... | 10,214 | 5,021 | 1,771 | 1,260 | 2,161 |
| Total ..... | 10,329 | 6,622 | 8,677 | 7,956 | 10,247 |

Messrs. Hirsch & Sohn, holding that the bulk of this material is rich, like Boleo mattes and Corocoro ores, estimate its contents at 70 per cent, and on this basis estimate the copper consumption of France as follows:

*Copper consumption of France.*

[Metric tons.]

| | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Imports, raw material.. | 26,271 | 25,743 | 34,352 | 44,026 | 50,060 |
| Contents of ore ..... | 7,230 | 4,635 | 6,074 | 5,570 | 8,685 |
| Total ..... | 33,501 | 30,378 | 40,426 | 49,596 | 58,745 |
| Increase (+) or decrease (—) of stocks..... | +355 | +1,459 | —103 | —589 | —379 |
| Consumption..... | 33,856 | 31,837 | 40,323 | 49,007 | 58,366 |

These figures are valuable as showing the very rapid increase in the consumption.

## THE GERMAN COPPER TRADE.

German copper consumption has grown very rapidly. The following table, compiled by Messrs. Aron Hirsch & Sohn, of Halberstadt, shows the principal figures. There is included in the production the copper extracted in German metallurgical works from imported ores and mattes. An allowance is made for this in the table.

*Copper consumption of Germany.*

[Metric tons.]

| | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|
| Imports | 46,153 | 44,514 | 51,806 | 52,504 | 59,742 | 73,123 | 82,903 |
| Exports | 9,973 | 9,817 | 11,304 | 10,406 | 10,893 | 12,452 | 12,568 |
| Excess of imports | 36,180 | 34,697 | 40,502 | 42,098 | 48,849 | 60,671 | 70,335 |
| Production | 24,688 | 25,406 | 24,011 | 25,857 | 26,013 | 29,489 | a29,550 |
| Total | 60,868 | 60,103 | 64,513 | 67,955 | 74,862 | 90,160 | 99,885 |
| Copper contents of imported copper ore and iron pyrites | 4,000 | 4,000 | 4,000 | 5,000 | 4,500 | 5,000 | 3,500 |
| Home consumption | 56,868 | 56,103 | 60,513 | 62,955 | 70,362 | 85,160 | 96,385 |

a Estimated.

Turning first to the imports, it may be noted that in 1897 these included 67,572 metric tons of bars and ingots, 4,199 tons of coins and old copper, 1,082 tons copper contents of brass, old and new, and 1,510 tons contents of imported ores. The source of the imports of bars and ingots during recent years has been—

*Source of German imports of ingot copper.*

[Metric tons.]

| Country. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| Free port (Hamburg) | 1,689 | 1,185 | 2,371 | 2,669 |
| Belgium | 356 | 356 | 115 | 9 |
| France | 203 | 152 | 81 | 268 |
| Norway | 128 | 362 | 71 | 45 |
| Austria-Hungary | 50 | 197 | 11 | 9 |
| Sweden | 33 | 83 | 198 | 250 |
| Switzerland | ..... | ..... | 5 | 6 |
| Spain | 10 | ..... | 10 | 41 |
| England | 7,430 | 7,363 | 7,478 | 8,660 |
| Netherlands | 109 | 139 | 73 | 18 |
| United States | 23,795 | 31,311 | 42,504 | 50,420 |
| Japan | 2,072 | 1,932 | 1,916 | 2,655 |
| Chile | 884 | 825 | 827 | 2,217 |
| Australia | ..... | 313 | 183 | 259 |
| Other countries | 173 | 147 | 271 | 46 |
| Total | 37,032 | 44,365 | 56,114 | 67,572 |

The production of Germany for a series of years has been as follows. The output of the Mansfeld Company is added, since that corporation is the dominating factor:

*Copper production of Germany.*

[Metric tons.]

| Year. | Total production. | Production of Mansfeld. |
|---|---|---|
| 1891 | 24,688 | 15,365 |
| 1892 | 25,406 | 15,588 |
| 1893 | 24,011 | 14,358 |
| 1894 | 25,857 | 15,217 |
| 1895 | 26,013 | 15,083 |
| 1896 | 29,489 | 18,541 |
| 1897 | 29,541 | 18,248 |

It will be observed that Mansfeld considerably increased its production in 1896, and has since held its own.

A very notable fact in connection with the German copper trade is the rapid expansion in exports of copper manufactures, which reached a climax in 1896. Since 1891 the exports have doubled, as is shown by the following table:

*Exports of copper manufactures from 1891 to 1897, inclusive.*

[Metric tons.]

| | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|
| Rods and sheets .... | 4,151 | 4,507 | 4,889 | 5,009 | 4,700 | 5,429 | 5,712 |
| Wire..... | 2,166 | 2,565 | 3,052 | 4,433 | 3,975 | 5,909 | 6,175 |
| Cables ..... | 2,030 | 1,526 | 1,957 | 2,193 | 3,713 | 7,631 | 8,119 |
| Miscellaneous ..... | 558 | 492 | 563 | 501 | 556 | 279 | 245 |
| Coarse forgings .... | 2,311 | 1,902 | 2,050 | 2,538 | 2,643 | 2,648 | 2,703 |
| Cartridges, caps, etc. | 2,221 | 2,374 | 3,682 | 3,376 | 4,450 | 4,156 | 2,712 |
| Fine copper goods.. | 3,106 | 3,234 | 3,859 | 4,117 | 4,912 | 7,837 | 7,425 |
| Totals ..... | 16,543 | 16,600 | 20,052 | 22,167 | 24,949 | 33,889 | 33,091 |

## THE RUSSIAN COPPER TRADE.

The following table shows the consumption of copper in Russia, to which American producers contribute to some extent:

*Copper consumption of Russia.*

[Metric tons.]

| | 1892. | 1893. | 1894. | 1895. | 1896. |
|---|---|---|---|---|---|
| Imports of fine copper ..... | 7,803 | 12,340 | 10,442 | 11,033 | 14,090 |
| Imports of manufactures.... | 1,032 | 1,442 | 1,049 | 655 | 723 |
| Production..... | 4,901 | 5,436 | 5,730 | 5,413 | 5,721 |
| Consumption..... | 13,736 | 19,218 | 17,221 | 17,101 | 20,534 |

The production of the Russian mines during 1894, 1895, and 1896 was as follows, by districts, in poods:

*Copper production in Russia.*

[Poods.]

| | 1894. | 1895. | 1896. |
|---|---|---|---|
| Caucasus | 150,000 | 145,805 | 149,698 |
| Ural | 155,000 | 149,032 | 166,205 |
| Altai | 17,000 | 12,566 | 13,240 |
| Steppes district | ..... | ..... | 1,868 |
| Finland: Pitkaranda | 27,500 | 20,274 | 18,000 |
| Total | 349,500 | 327,677 | 349,011 |
| In metric tons (61 poods) | 5,730 | 5,372 | 5,721 |

Summarizing the estimates of Messrs. Aron Hirsch & Sohn, we have the following as the copper consumption of the leading European countries:

*Copper consumption of leading European countries.*

[Metric tons.]

| Country. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Germany | 60,513 | 62,955 | 70,349 | 85,371 | 96,385 |
| England | 96,615 | 90,069 | 91,184 | 115,557 | 110,210 |
| France | 33,856 | 31,837 | 40,323 | 49,007 | 58,366 |
| Austria | 14,901 | 16,457 | 15,735 | 16,498 | 18,288 |
| Russia | 19,218 | 17,221 | 17,101 | 20,534 | 20,000 |
| Total | 225,103 | 218,539 | 234,692 | 286,967 | 303,249 |

This is exclusive of the United States, whose consumption is estimated at 101,404 metric tons in 1897, based on the returns of the American Associated Companies and neglecting stocks, a course which is justified by the absence of any reliable data on the subject.

The Metallgesellschaft, of Frankfurt-am-Main, Germany, presents a somewhat different series of statistics, endeavoring to cover the consumption of the world. These statistics exhibit, also, what after all is the main fact, that the consumption of the metal has greatly increased in recent years. We present the data covering the period of 1891 to 1897, both inclusive:

*The world's consumption of copper from 1891 to 1897.*

[Metric tons.]

| Country. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|
| Germany | 52,027 | 50,681 | 54,949 | 56,145 | 63,813 | 79,438 | 89,798 |
| Great Britain | 91,496 | 81,279 | 91,109 | 100,661 | 83,476 | 104,247 | 105,263 |
| France | 32,058 | 28,438 | 30,456 | 30,689 | 37,738 | 43,224 | 49,868 |
| Austria-Hungary | 10,287 | 9,456 | 12,675 | 14,744 | 12,748 | 14,598 | 17,058 |
| Italy | 3,818 | 4,535 | 5,257 | 6,344 | 6,641 | 7,156 | 7,810 |
| Belgium | *a* 4,000 | *a* 4,000 | *a* 4,000 | *a* 5,000 | *a* 5,000 | *a* 5,500 | *a* 6,200 |
| Netherlands | *a* 2,400 | *a* 2,400 | *a* 2,400 | *a* 2,400 | *a* 2,400 | *a* 2,400 | *a* 2,400 |
| Russia | 8,300 | 11,500 | 13,800 | 11,700 | 12,400 | 15,200 | *a* 15,100 |
| Denmark, Sweden, Switzerland, Spain, Balkan countries | 1,500 | 1,700 | 2,000 | 2,100 | 1,900 | 2,100 | *a* 2,100 |
| Exports of copper from Europe: | | | | | | | |
| To countries enumerated | 3,500 | 1,200 | 3,000 | 800 | 700 | 1,000 | *a* 1,000 |
| To countries not enumerated | 1,100 | 800 | 800 | 700 | 700 | 500 | *a* 500 |
| European consumption and available for export | 210,486 | 195,989 | 220,446 | 231,283 | 227,516 | 275,363 | 297,097 |
| United States consumption, disregarding stocks | 82,526 | 117,465 | 66,891 | 88,623 | 117,817 | 91,638 | 96,713 |
| Consumption of Japan copper in eastern Asia | 6,348 | 9,883 | 12,668 | 14,027 | 8,424 | 15,100 | *a* 16,000 |
| World's consumption | 299,360 | 323,337 | 300,005 | 333,933 | 353,757 | 382,101 | 409,810 |

*a* Estimated.

It will be observed that the most violent fluctuations are those attributed to the United States. This undoubtedly is due to some extent to the absence of any data as to stocks, but if the fluctuations in the demand of other metals, notably of iron, be a criterion, it is probably true that our consumption has undergone extraordinary vicissitudes since 1891.

## THE LEADING FOREIGN PRODUCERS.

The statistics of production of the largest foreign producer—the Rio Tinto Company—are shown in the following table for a series of years:

*Pyrites and copper statistics of the Rio Tinto Company, Spain.*

| Year. | Pyrites extracted. | | | | Pyrites consumed (average copper contents). | | Copper produced at mines. |
|---|---|---|---|---|---|---|---|
| | For shipment. | For local treatment. | Total. | Average copper contents. | | | |
| | *Tons.* | *Tons.* | *Tons.* | *Per cent.* | *Tons.* | *Per cent.* | *Tons.* |
| 1876..... | 189,962 | 159,196 | 349,158 | 1.5 | 158,597 | 1.5 | 946 |
| 1877..... | 251,360 | 520,391 | 771,751 | 2.375 | 211,487 | 2 | 2,495 |
| 1878..... | 218,818 | 652,289 | 871,107 | 2.78 | 211,403 | 2.18 | 4,184 |
| 1879..... | 243,241 | 663,359 | 906,600 | 2.78 | 236,849 | 2.45 | 7,179 |
| 1880..... | 277,590 | 637,567 | 915,157 | 2.865 | 274,210 | 2.481 | 8,559 |
| 1881..... | 249,098 | 743,949 | 993,047 | 2.75 | 256,827 | 2.347 | 9,466 |
| 1882..... | 259,924 | 688,307 | 948,231 | 2.805 | 272,826 | 2.401 | 9,740 |
| 1883..... | 313,291 | 786,682 | 1,099,973 | 2.956 | 288,104 | 2.387 | 12,295 |
| 1884..... | 312,028 | 1,057,890 | 1,369,918 | 3.234 | 314,751 | 2.241 | 12,668 |
| 1885..... | 406,772 | 944,694 | 1,351,466 | 3.102 | 354,501 | 2.27 | 14,593 |
| 1886..... | 336,548 | 1,041,833 | 1,378,381 | 3.046 | 347,024 | 2.306 | 15,863 |
| 1887..... | 362,796 | 819,642 | 1,182,438 | 3.047 | 385,842 | 2.283 | 17,813 |
| 1888..... | 434,316 | 969,317 | 1,403,633 | 2.949 | 393,149 | 2.208 | 18,522 |
| 1889..... | 389,943 | 824,380 | 1,214,323 | 2.854 | 395,081 | 2.595 | 18,708 |
| 1890..... | 396,349 | 865,405 | 1,261,754 | 2.883 | 397,875 | 2.595 | 19,183 |
| 1891..... | 464,027 | 972,060 | 1,436,087 | 2.649 | 432,532 | 2.651<br>1.309 | 21,227 |
| 1892..... | 406,912 | 995,151 | 1,402,063 | 2.819 | 435,758 | 2.569<br>1.465 | 20,017 |
| 1893..... | 477,656 | 854,346 | 1,332,002 | 2.996 | 469,339 | 2.659<br>1.544 | 20,887 |
| 1894..... | 498,540 | 888,555 | 1,387,095 | 3.027 | 485,441 | 2.594<br>.988 | 20,606 |
| 1895..... | 525,195 | 847,181 | 1,372,376 | 2.821 | 518,560 | 2.595<br>.986 | 20,762 |
| 1896..... | 591,752 | 845,580 | 1,437,332 | 2.931 | 549,585 | 2.529<br>1.068 | 20,817 |
| 1897..... | 575,733 | 812,293 | 1,388,026 | 2.810 | 582,540 | 2.595<br>.967 | 20,826 |

The Rio Tinto Company had the most prosperous year in its history, having paid in 1897 5 per cent on its preference share capital of £1,625,000 and 40 per cent on a like amount of common stock, besides adding £40,000 to the reserve, bringing that fund up to £140,000.

As shown in the table, the total product was 1,388,026 tons of pyrites, with an average content of 2.81 per cent. The quantity of pyrites invoiced to consumers was 582,540 tons in 1897, against 549,585 tons in 1896, 518,560 tons in 1895, and 485,441 tons in 1894. In spite of the smaller production of ore, the quantity of copper brought to market was the largest on record, consisting of 19,894 tons of refined copper, 1,050 tons in sulphate of copper, and 12,487 tons in pyrites, a total of 33,431 tons. The production for the year was 33,924 tons, of which 20,826 tons were produced by treatment at the mines, and 13,098 tons were the copper contents of pyrites shipped. There are now 111,406 tons of fine copper in the reserve heaps, which stand on the books of the company at a cost of £4 6s 10d. The Cwmavon smelting plant of the company turned out 20,038 tons of refined copper, the largest on record.

During the fiscal year the share capital was divided into 325,000 5-per-cent preference shares of £5 each, and a like amount of common stock, while there are outstanding £3,489,860 of 4-per-cent mortgage bonds. After providing for all interest, expenses of administration, income and other taxes, and including a balance brought forward of £21,532, the gross profit amounted to £895,822. Writing off £23,319 for development works, £24,180 for depreciation of plant, £56,160 for bond sinking fund, and £40,000 placed to reserve, left a balance of £752,163, out of which dividends aggregating £729,896 were paid.

The report of the Tharsis Company shows that the total quantity of mineral raised was 565,949 tons in 1897, as compared with 557,577 tons in 1896 and 612,483 tons in 1895. The shipments of pyrites were heavily increased, having been 310,702 tons in 1897, as compared with 239,725 tons in 1896 and 226,829 tons in 1895. A good rainfall favored the local production of precipitate, which was 8,906 tons in 1897, as compared with 7,538 tons in 1896 and 9,443 tons in 1895. The gross profits were £383,972, against £277,469 in 1896 and £301,711 in 1895, the net profits standing, respectively, £310,957, £218,769, and £219,491. The dividend of 25 per cent absorbed £312,500, being an increase as compared with 1895 and 1896, when 17½ per cent was paid.

Mason & Barry, Limited, whose mines are in Portugal, have, like the two preceding concerns, largely increased their sales and shipments of pyrites, having invoiced and shipped ore for its sulphur value to the quantity of 272,498 tons in 1897, as compared with 205,206 tons in 1896. The total quantity of ore broken and raised was 177,549 tons in 1897, as compared with 192,428 tons in 1896. After writing off for depreciation the sum of £18,717, and deducting management expenses and income tax, the profit amounted to £45,088. Out of this dividends aggregating £37,034 were paid.

the half year the income was £126,503 for blister copper and £10,631 profits of railroad, a total of £137,134. The costs aggregated £64,026 and £6,384 for other expenses, leaving a net profit of £66,724, or £1 12s. 2d. per ton of ore treated. Dividends aggregating £44,220 were paid, leaving a balance of £22,504. The half year ending March 31, 1898, found the entire smelting plant of five furnaces running, the quantity of ore treated being 62,868 tons. During that period the cost of mining was 2s. 4.64d., of removal of over burden 2s., of smelting 17s. 9.87d., and of converter operations 2s. 9.18d., a total of £1 4s. 11.67d.

Another Australian company, which has been a producer for many years, is the Wallaroo and Moonta Mining Company, of South Australia, which during its history has paid in dividends £1,710,254. During the calendar year 1897 the company made a net profit of £22,294, paying £8,000 in dividends. In 1896 the company mined 29,817 tons of ore, which yielded an average of 16.4 per cent of copper, the product having been 4,801 long tons of refined copper. In 1897 the output of ore had reached 32,790 tons of an average of 15.5 per cent, the product of copper being 5,073 long tons. The company is embarking also in lead-silver smelting at Wallaroo.

# LEAD.

By CHARLES KIRCHHOFF.

## INTRODUCTION.

Stimulated by a considerable rise in prices, and unhampered by any labor complications, the quantity of lead produced from ores mined in the United States reached its maximum in the year 1897 with a total of 212,000 short tons as compared with 188,000 tons in 1896 and 178,554 tons in 1891.

## PRODUCTION.

The following tables present the figures of the total gross production of lead in the United States from 1825. Up to the year 1882 the figures have been compiled from the best data available. Since 1882 the statistics are those collected by this office, with the exception of the year 1889, when they were gathered by the Census Office:

*Production of refined lead in the United States from 1825 to 1872, inclusive.*

| Year. | Production. | Year. | Production. | Year. | Production. |
|---|---|---|---|---|---|
| | *Short tons.* | | *Short tons.* | | *Short tons.* |
| 1825 | 1,500 | 1844 | 26,000 | 1859 | 16,400 |
| 1830 | 8,000 | 1845 | 30,000 | 1860 | 15,600 |
| 1831 | 7,500 | 1846 | 28,000 | 1861 | 14,100 |
| 1832 | 10,000 | 1847 | 28,000 | 1862 | 14,200 |
| 1833 | 11,000 | 1848 | 25,000 | 1863 | 14,800 |
| 1834 | 12,000 | 1849 | 23,500 | 1864 | 15,300 |
| 1835 | 13,000 | 1850 | 22,000 | 1865 | 14,700 |
| 1836 | 15,000 | 1851 | 18,500 | 1866 | 16,100 |
| 1837 | 13,500 | 1852 | 15,700 | 1867 | 15,200 |
| 1838 | 15,000 | 1853 | 16,800 | 1868 | 16,400 |
| 1839 | 17,500 | 1854 | 16,500 | 1869 | 17,500 |
| 1840 | 17,000 | 1855 | 15,800 | 1870 | 17,830 |
| 1841 | 20,500 | 1856 | 16,000 | 1871 | 20,000 |
| 1842 | 24,000 | 1857 | 15,800 | 1872 | 25,880 |
| 1843 | 25,000 | 1858 | 15,300 | | |

From 1873 to 1885, inclusive, the production was separated into two groups, that of desilverized lead obtained from smelting argentiferous ores drawn from the Rocky Mountain region, and that of "soft" lead produced from nonargentiferous ores of the Mississippi Valley. The latter also includes small quantities obtained from Virginia and Tennessee. In 1886 the treatment of foreign ores in American smelting works began to assume importance, and it became necessary to make allowance for the quantities involved in order to arrive at the actual lead product of the United States. Later the refining in bond of foreign base bullion became an important industry. Varying quantities of the metal so produced are retained for home consumption, so that it became necessary to make special inquiries dealing with this feature. The growing complications make it impossible to arrive at an exact statement of the lead obtained from domestic sources, so that only a close estimate is possible. The table below covers the period in question.

In 1894, after a careful consideration of the methods possible, the system was adopted of appealing to the smelters for a statement showing the source territorially of the lead contents of the ore worked by them. This was regarded as the most satisfactory and direct means, not alone for reaching a sound basis for an estimate of the actual lead product of the United States, but also, at the same time, afforded an opportunity for reaching precise data relative to the contribution and the total of the different States and Territories. The result of the investigations thus made is embodied in the following table:

*Production of refined lead in the United States from 1873 to 1897.*

| Year. | Total production. (a) | Desilverized lead. (a) | Soft lead. (b) | From foreign ores and base bullion. | Net American product. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1873..... | 42,540 | 20,159 | 22,381 | ..... | 42,540 |
| 1874..... | 52,080 | ..... | ..... | ..... | 52,080 |
| 1875..... | 59,640 | 34,909 | 24,731 | ..... | 59,640 |
| 1876..... | 64,070 | 37,649 | 26,421 | ..... | 64,070 |
| 1877..... | 81,900 | 50,748 | 31,152 | ..... | 81,900 |
| 1878..... | 91,060 | 64,290 | 26,770 | ..... | 91,060 |
| 1879..... | 92,780 | 64,650 | 28,130 | ..... | 92,780 |
| 1880..... | 97,825 | 70,135 | 27,690 | ..... | 97,825 |
| 1881..... | 117,085 | 86,315 | 30,770 | ..... | 117,085 |
| 1882..... | 132,890 | 103,875 | 29,015 | ..... | 132,890 |
| 1883..... | 143,957 | 122,157 | 21,800 | ..... | 143,957 |
| 1884..... | 139,897 | 119,965 | 19,932 | ..... | 139,897 |
| 1885..... | 129,412 | 107,437 | 21,975 | ..... | 129,412 |

*a* Including foreign base bullion refined in bond.
*b* Including a small quantity of lead produced in the Southern States.

*Production of refined lead in the United States from 1873 to 1897*—Continued.

| Year. | Total production. (a) | Desilverized lead. (a) | Soft lead. (b) | From foreign ores and base bullion. | Net American product. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1886..... | 135,629 | 114,829 | 20,800 | c5,000 | c130,629 |
| 1887..... | 160,700 | 135,552 | 25,148 | c15,000 | c145,700 |
| 1888..... | 180,555 | 151,465 | 29,090 | 28,636 | 151,919 |
| 1889..... | 182,967 | 153,709 | 29,258 | 26,570 | 156,397 |
| 1890..... | 161,754 | 130,403 | 31,351 | 18,124 | 143,630 |
| 1891..... | 202,406 | 171,009 | 31,397 | 23,852 | 178,554 |
| 1892..... | 213,262 | 181,584 | 31,678 | 39,957 | 173,305 |
| 1893..... | 229,333 | 196,820 | 32,513 | 65,351 | 163,982 |
| 1894..... | 219,090 | 181,404 | 37,686 | 59,739 | d162,686 |
| 1895..... | 241,882 | 201,992 | 39,890 | 76,173 | d170,000 |
| 1896..... | 264,994 | 221,457 | 43,537 | 77,738 | d188,000 |
| 1897..... | 291,036 | 247,483 | 43,553 | 83,671 | d212,000 |

a Including foreign base bullion refined in bond.
b Including a small quantity of lead produced in the Southern States.
c Estimated.
d Arrived at from direct returns from smelters.

Since 1891 special returns from desilverizers have been made on the quantity of antimonial or hard lead produced. The quantity was 4,043 tons in 1891, 5,039 tons in 1892, and 5,013 tons in 1893. In 1896 the production of hard lead was 7,507 tons, rising to 8,867 tons in 1897.

The following is a comparison of half-yearly periods:

*Comparison of half-yearly periods.*

| | 1894. | | 1895. | |
|---|---|---|---|---|
| | First half. | Second half. | First half. | Second half. |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Desilverized lead | 86,772 | 94,632 | 87,957 | 114,035 |
| Soft lead | 15,610 | 22,076 | 18,013 | 21,877 |
| Total production refined lead | 102,382 | 116,708 | 105,970 | 135,912 |
| Exported: | | | | |
| Base bullion, refined in bond; Ores, smelted in bond | 21,392 | 17,243 | 17,458 | 37,238 |
| Available for home consumption | 80,990 | 99,465 | 88,512 | 98,674 |

| | 1896. | | 1897. | | 1898. |
|---|---|---|---|---|---|
| | First half. | Second half. | First half. | Second half. | First half. |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Desilverized lead | 109,592 | 111,865 | 111,838 | 135,645 | 131,188 |
| Soft lead | 21,103 | 22,434 | 21,621 | 21,932 | 24,486 |
| Total production refined lead | 130,695 | 134,299 | 133,459 | 157,577 | 155,674 |
| Exported: | | | | | |
| Base bullion, refined in bond; Ores, smelted in bond | 26,119 | 25,656 | 26,838<br>2,720 | 25,431<br>7,420 | 33,439<br>7,308 |
| Available for home consumption | 104,576 | 108,643 | 103,901 | 124,726 | 114,927 |

For a series of years returns have been received from the smelters of lead ores in the United States showing the source, geographically, of the lead contents of the ores worked by them. This is the only method for obtaining a close estimate of the lead products of the different States and Territories. It is found to yield better results than a laborious and uncertain census of the mines.

The returns since 1894 are summarized in the following table:

*Source of lead in American ores smelted.*

| State or Territory. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Colorado | 50,613 | 46,984 | 44,803 | 40,576 |
| Idaho | 33,308 | 31,638 | 46,662 | 58,627 |
| Utah | 23,190 | 31,305 | 35,578 | 40,537 |
| Montana | 9,637 | 9,802 | 11,070 | 12,930 |
| New Mexico | 2,973 | 3,040 | 3,461 | 9,123 |
| Nevada | 2,254 | 2,583 | 1,173 | 959 |
| Arizona | 1,480 | 2,053 | 1,165 | 2,184 |
| California | 478 | 949 | 691 | 383 |
| Washington, Oregon, Alaska, South Dakota, Texas | 150 | 381 | 1,006 | 638 |
| Missouri, Kansas, Wisconsin, Illinois, Iowa, Virginia | 46,300 | 53,596 | 51,887 | 56,542 |
| Total lead contents American ores smelted | 170,383 | 182,331 | 197,496 | 222,499 |
| Contents Mexican ores | a 21,000 | 16,437 | 15,403 | 13,430 |
| Contents Canadian ores | | 5,040 | 10,100 | 19,515 |
| Contents miscellaneous or unknown | ..... | ..... | 2,118 | 344 |

a Estimated.

The figures presented for Missouri, Kansas, etc., are an aggregate of two sets of returns, one the actual pig lead made by local smelters, usually reported, as above, as "soft lead," and the other the lead contents of ores, concentrates, and furnace products purchased by lead desilverizing works. In estimating the actual lead product the soft lead must first be deducted from the totals in the table. Then the allowance for waste in smelting and desilverizing is made on the balance. For the year 1897 the results are as follows: The lead contents of ores smelted, deducting the pig lead from Missouri, Kansas, and other districts (43,553 tons), amounted to 178,946 tons. Deducting 6 per cent for loss in smelting and desilverizing, we have 168,209 tons from American ores. Adding the 43,553 tons of pig lead, we reach a total of American lead of 211,772 tons. Based on these figures this office accepts 212,000 short tons as the product of American lead for the year 1897.

It is interesting to check this result by another method of reaching the net American product, which, however, is not considered to be so accurate. The total lead product for 1897 was 291,036 short tons. Deducting the base bullion desilverized in bond, 58,154 tons, and 94 per cent of the 33,289 tons of lead contents of foreign ores smelted, a total deduction of 89,446 tons is reached, leaving as a balance 201,590

tons, which compares with 212,000 tons reached by the direct method. This, of course, is based on an assumed waste of 6 per cent in smelting ores and in subsequent desilverizing.

## CONSUMPTION.

Based on the data at hand, the following estimate is presented of the consumption of lead in recent years. The figures representing domestic stocks are aggregates of returns received by this office. They are not, however, complete.

*Estimate of the consumption of lead in the United States from 1894 to 1897.*

| | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| Supply— | | | | |
| Total product desilverized lead | *Short tons.* 181,404 | *Short tons.* 201,992 | *Short tons.* 221,457 | *Short tons.* 247,483 |
| Soft lead | 37,686 | 39,890 | 43,537 | 43,553 |
| Imports, foreign refined | 8,200 | 22,947 | 2,020 | 2,000 |
| Stock, domestic, beginning of year | 7,496 | 8,586 | 9,557 | 9,299 |
| Stock, foreign in bond, beginning of year | 3,302 | 7,181 | 9,865 | 4,124 |
| Total supply | 238,088 | 280,596 | 286,436 | 306,459 |
| Deduct— | | | | |
| Foreign base bullion and ores refined in bond and exported | 29,000 | 18,130 | 57,612 | 62,409 |
| Lead in manufactures exported under drawback | 950 | 2,000 | 1,500 | 500 |
| Stock, domestic, close of year | 8,586 | 9,557 | 9,299 | 17,608 |
| Stock, foreign in bond | 7,181 | 9,865 | 4,124 | 6,694 |
| Total | 45,717 | 39,552 | 72,535 | 87,211 |
| Consumption | 192,371 | 241,044 | 213,901 | 219,248 |

It will be observed that there has been only a moderate increase in the consumption in 1897, in the face of a heavily increased output from domestic sources. The exports of foreign material under drawback was not much expanded, but stocks of lead held in this country, as indicated by the partial returns, were considerably increased.

## IMPORTS AND EXPORTS.

The following tables, from the records of the Bureau of Statistics, show the imports and exports of lead and its manufactures for a series of years:

*Lead imported and entered for consumption in the United States, 1867 to 1897.*

| Year ending— | Ore and dross. | | Pigs and bars. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| June 30— | *Pounds.* | | *Pounds.* | |
| 1867 | 611 | $25 | 65,322,923 | $2,812,668 |
| 1868 | 6,945 | 239 | 63,254,677 | 2,668,915 |
| 1869 | ..... | ..... | 87,865,471 | 3,653,481 |
| 1870 | 5,973 | 176 | 85,895,724 | 3,530,837 |
| 1871 | 316 | 10 | 91,496,715 | 3,721,096 |
| 1872 | 32,231 | 1,425 | 73,086,657 | 2,929,623 |
| 1873 | ..... | ..... | 72,423,641 | 3,233,011 |
| 1874 | ..... | ..... | 46,205,154 | 2,231,817 |
| 1875 | 13,206 | 320 | 32,770,712 | 1,559,017 |
| 1876 | ..... | ..... | 14,329,366 | 682,132 |
| 1877 | 1,000 | 20 | 14,583,845 | 671,482 |
| 1878 | ..... | ..... | 6,717,052 | 294,233 |
| 1879 | ..... | ..... | 1,216,500 | 42,983 |
| 1880 | ..... | ..... | 6,723,706 | 246,015 |
| 1881 | 5,981 | 97 | 4,322,068 | 159,129 |
| 1882 | 21,698 | 500 | 6,079,304 | 202,603 |
| 1883 | 600 | 17 | 4,037,867 | 130,108 |
| 1884 | 419 | 13 | 3,072,738 | 85,395 |
| 1885 | 4,218 | 57 | 5,862,474 | 143,103 |
| 1886 | 715,588 | 9,699 | 17,582,298 | 491,310 |
| December 31— | | | | |
| 1887 | 153,731 | 21,487 | 7,716,783 | 219,770 |
| 1888 | 88,870 | 2,468 | 2,582,236 | 69,891 |
| 1889 | 328,315 | 7,468 | 2,773,622 | 76,243 |
| 1890 | 11,065,865 | 504,067 | 19,336,233 | 593,671 |
| 1891 | 40,692,478 | 1,120,067 | 3,392,562 | 104,184 |
| 1892 | 54,249,291 | 1,278,114 | 1,549,771 | 110,953 |
| 1893 | 58,487,319 | 1,004,295 | 3,959,781 | 129,290 |
| 1894 | 33,020,250 | 437,999 | 39,168,529 | 895,496 |
| 1895 | 45,050,674 | 687,222 | 109,551,082 | 2,052,209 |
| 1896 | 37,829,583 | 631,381 | 10,551,148 | 191,479 |
| 1897 | 31,036,882 | 535,094 | 16,050,987 | 314,549 |

*Lead imported and entered for consumption in the United States, 1867 to 1897*—Continued.

| Year ending— | Sheets, pipe, and shot. | | Shot. | | Not otherwise specified. | Total value. |
|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | | |
| June 30— | *Pounds.* | | *Pounds.* | | | |
| 1867 | 185,825 | $9,560 | ..... | ..... | $6,222 | $2,828,475 |
| 1868 | 142,137 | 7,229 | ..... | ..... | 6,604 | 2,682,987 |
| 1869 | 307,424 | 15,531 | ..... | ..... | 18,885 | 3,687,897 |
| 1870 | 141,681 | 6,879 | ..... | ..... | 10,444 | 3,548,336 |
| 1871 | 86,712 | 4,209 | ..... | ..... | 8,730 | 3,734,045 |
| 1872 | 15,518 | 859 | ..... | ..... | 20,191 | 2,952,098 |
| 1873 | 105 | 12 | 420 | $50 | 21,503 | 3,254,576 |
| 1874 | ..... | ..... | 30,219 | 1,349 | 36,484 | 2,269,650 |
| 1875 | ..... | ..... | 58 | 4 | 25,774 | 1,585,115 |
| 1876 | ..... | ..... | 20,007 | 1,204 | 27,106 | 710,442 |
| 1877 | ..... | ..... | 16,502 | 1,242 | 1,041 | 673,785 |
| 1878 | ..... | ..... | 15,829 | 963 | 113 | 295,309 |
| 1879 | ..... | ..... | 3,748 | 209 | 930 | 44,122 |
| 1880 | ..... | ..... | 1,120 | 54 | 371 | 246,440 |
| 1881 | ..... | ..... | 900 | 65 | 1,443 | 160,734 |
| 1882 | ..... | ..... | 1,469 | 99 | 2,449 | 205,651 |
| 1883 | ..... | ..... | 1,510 | 79 | 8,030 | 138,234 |
| 1884 | 15,040 | 630 | ..... | ..... | 1,992 | 88,030 |
| 1885 | 971,951 | 22,217 | ..... | ..... | 1,372 | 166,749 |
| 1886 | 27,357 | 1,218 | ..... | ..... | 964 | 503,191 |
| December 31— | | | | | | |
| 1887 | 27,941 | 1,286 | ..... | ..... | 302 | 242,845 |
| 1888 | 23,103 | 1,202 | ..... | ..... | 977 | 74,538 |
| 1889 | 35,859 | 1,417 | ..... | ..... | 1,297 | 86,425 |
| 1890 | 91,660 | 5,591 | ..... | ..... | 1,136 | 1,104,465 |
| 1891 | 334,179 | 12,406 | ..... | ..... | 604 | 1,237,467 |
| 1892 | 90,135 | 6,207 | ..... | ..... | 2,063 | 1,397,337 |
| 1893 | 59,798 | 2,955 | ..... | ..... | 1,691 | 1,138,231 |
| 1894 | 44,080 | 2,050 | ..... | ..... | 536 | 1,336,081 |
| 1895 | 128,008 | 5,030 | ..... | ..... | 1,277 | 2,745,738 |
| 1896 | 96,010 | 3,818 | ..... | ..... | 644 | 827,322 |
| 1897 | 95,891 | 4,042 | ..... | ..... | 513 | 854,198 |

*Old and scrap lead imported and entered for consumption in the United States, 1867 to 1889.*

| Year ending— | Quantity. | Value. | Year ending— | Quantity. | Value. |
|---|---|---|---|---|---|
| June 30— | *Pounds.* | | June 30— | *Pounds.* | |
| 1867 | 1,256,233 | $53,202 | 1880 | 213,063 | $5,262 |
| 1868 | 2,465,575 | 101,586 | 1881 | 123,018 | 2,729 |
| 1869 | 2,983,272 | 123,068 | 1882 | 220,702 | 5,949 |
| 1870 | 3,756,785 | 150,379 | 1883 | 1,094,133 | 31,724 |
| 1871 | 2,289,688 | 94,467 | 1884 | 160,356 | 4,830 |
| 1872 | 4,257,778 | 171,324 | 1885 | 4,866 | 106 |
| 1873 | 3,545,098 | 151,756 | December 31— | | |
| 1874 | 395,516 | 13,897 | 1886 | 24,726 | 882 |
| 1875 | 382,150 | 13,964 | 1887 | 136,625 | 4,323 |
| 1876 | 265,860 | 9,534 | 1888 | 33,100 | 904 |
| 1877 | 249,645 | 8,383 | 1889 | 50,816 | 1,494 |
| 1878 | 106,342 | 3,756 | 1890 | (a) | (a) |
| 1879 | 42,283 | 1,153 | | | |

a Included in pigs and bars after 1889.

*Lead, and manufactures of lead, of domestic production, exported from the United States.*

| Year ending— | Manufactures of— | | | Pigs, bars, and old. | | Total value. |
|---|---|---|---|---|---|---|
| | Lead. | | Pewter and lead. | | | |
| | Quantity. | Value. | Value. | Quantity. | Value. | |
| September 30— | *Pounds.* | | | *Pounds.* | | |
| 1790 | 13,440 | $810 | | | | $810 |
| 1803 | a 900 | | | | | |
| 1804 | 19,804 | | | | | |
| 1805 | 8,000 | | | | | |
| 1808 | 40,583 | | | | | |
| 1809 | 126,537 | | | | | |
| 1810 | 172,323 | | | | | |
| 1811 | 65,497 | | | | | |
| 1812 | 74,875 | | | | | |
| 1813 | 276,940 | | | | | |
| 1814 | 43,600 | | | | | |
| 1815 | 40,245 | | | | | |
| 1816 | 35,844 | | | | | |
| 1817 | 111,034 | 9,993 | | | | 9,993 |
| 1818 | 281,168 | 22,493 | | | | 22,493 |
| 1819 | 94,362 | 7,549 | | | | 7,549 |
| 1820 | 25,699 | 1,799 | | | | 1,799 |

a Barrels.

*Lead, and manufactures of lead, of domestic production, exported, etc.*—Continued.

| Year ending— | Manufactures of— | | | Pigs, bars, and old. | | Total value. |
|---|---|---|---|---|---|---|
| | Lead. | | Pewter and lead. | | | |
| | Quantity. | Value. | Value. | Quantity. | Value. | |
| September 30— | *Pounds.* | | | *Pounds.* | | |
| 1821 | 56,192 | $3,512 | ..... | ..... | ..... | $3,512 |
| 1822 | 66,316 | 4,244 | ..... | ..... | ..... | 4,244 |
| 1823 | 51,549 | 3,098 | ..... | ..... | ..... | 3,098 |
| 1824 | 18,604 | 1,356 | ..... | ..... | ..... | 1,356 |
| 1825 | 189,930 | 12,697 | ..... | ..... | ..... | 12,697 |
| 1826 | 47,337 | 3,347 | $1,820 | ..... | ..... | 5,167 |
| 1827 | 50,160 | 3,761 | 6,183 | ..... | ..... | 9,944 |
| 1828 | 76,882 | 4,184 | 5,545 | ..... | ..... | 9,729 |
| 1829 | 179,952 | 8,417 | 5,185 | ..... | ..... | 13,602 |
| 1830 | 128,417 | 4,831 | 4,172 | ..... | ..... | 9,003 |
| 1831 | 152,578 | 7,068 | 6,422 | ..... | ..... | 13,490 |
| 1832 | 72,439 | 4,483 | 983 | ..... | ..... | 5,466 |
| 1833 | 119,407 | 5,685 | 2,010 | ..... | ..... | 7,695 |
| 1834 | 13,480 | 805 | 2,224 | ..... | ..... | 3,029 |
| 1835 | 50,418 | 2,741 | 433 | ..... | ..... | 3,174 |
| 1836 | 34,600 | 2,218 | 4,777 | ..... | ..... | 6,995 |
| 1837 | 297,488 | 17,015 | 3,132 | ..... | ..... | 20,147 |
| 1838 | 375,231 | 21,747 | 6,461 | ..... | ..... | 28,208 |
| 1839 | 81,377 | 6,003 | 12,637 | ..... | ..... | 18,640 |
| 1840 | 882,620 | 39,687 | 15,296 | ..... | ..... | 54,983 |
| 1841 | 2,177,164 | 96,748 | 20,546 | ..... | ..... | 117,294 |
| 1842 | 14,552,357 | 523,428 | 16,789 | ..... | ..... | 540,217 |
| June 30— | | | | | | |
| 1843 (*a*) | 15,366,918 | 492,765 | 7,121 | ..... | ..... | 499,886 |
| 1844 | 18,420,407 | 595,238 | 10,018 | ..... | ..... | 605,256 |
| 1845 | 10,188,024 | 342,646 | 14,404 | ..... | ..... | 357,050 |
| 1846 | 16,823,766 | 614,518 | 10,278 | ..... | ..... | 624,796 |
| 1847 | 3,326,028 | 124,981 | 13,694 | ..... | ..... | 138,675 |
| 1848 | 1,994,704 | 84,278 | 7,739 | ..... | ..... | 92,017 |
| 1849 | 680,249 | 30,198 | 13,196 | ..... | ..... | 43,394 |
| 1850 | 261,123 | 12,797 | 22,682 | ..... | ..... | 35,479 |
| 1851 | ..... | ..... | 16,426 | 229,448 | $11,774 | 28,200 |
| 1852 | ..... | ..... | 18,469 | 747,930 | 32,725 | 51,194 |
| 1853 | ..... | ..... | 14,064 | 100,778 | 5,540 | 19,604 |
| 1854 | ..... | ..... | 16,478 | 404,247 | 26,874 | 43,352 |
| 1855 | ..... | ..... | 5,233 | 165,533 | 14,298 | 19,531 |
| 1856 | ..... | ..... | 5,628 | 310,029 | 27,512 | 33,140 |
| 1857 | ..... | ..... | 4,818 | 870,544 | 58,624 | 63,442 |
| 1858 | ..... | ..... | 27,327 | 900,607 | 48,119 | 75,446 |

*a* Nine months.

*Lead, and manufactures of lead, of domestic production, exported, etc.*—Continued.

| Year ending— | Manufactures of— | | | Pigs, bars, and old. | | Total value. |
|---|---|---|---|---|---|---|
| | Lead. | | Pewter and lead. | | | |
| | Quantity. | Value. | Value. | Quantity. | Value. | |
| June 30— | *Pounds.* | | | *Pounds.* | | |
| 1859 | ..... | ..... | $28,782 | 313,988 | $28,575 | $57,357 |
| 1860 | ..... | ..... | 56,081 | 903,468 | 50,446 | 106,527 |
| 1861 | ..... | ..... | 30,534 | 109,023 | 6,241 | 36,775 |
| 1862 | ..... | ..... | 28,832 | 79,231 | 7,334 | 36,166 |
| 1863 | ..... | ..... | 30,609 | 237,239 | 22,634 | 53,243 |
| 1864 | ..... | ..... | 30,411 | 223,752 | 18,718 | 49,129 |
| 1865 | ..... | ..... | 29,271 | 852,895 | 132,666 | 161,937 |
| 1866 | ..... | ..... | 44,483 | 25,278 | 2,323 | 46,806 |
| 1867 | ..... | ..... | 27,559 | 99,158 | 5,300 | 32,859 |
| 1868 | ..... | ..... | 37,111 | 438,040 | 34,218 | 71,329 |
| 1869 | ..... | ..... | 17,249 | ..... | ..... | 17,249 |
| 1870 | ..... | $28,315 | ..... | ..... | ..... | 28,315 |
| 1871 | ..... | 79,880 | ..... | ..... | ..... | 79,880 |
| 1872 | ..... | 48,132 | ..... | ..... | ..... | 48,132 |
| 1873 | ..... | 13,392 | ..... | ..... | ..... | 13,392 |
| 1874 | ..... | 302,044 | ..... | ..... | ..... | 302,044 |
| 1875 | ..... | 429,309 | ..... | ..... | ..... | 429,309 |
| 1876 | ..... | 102,726 | ..... | ..... | ..... | 102,726 |
| 1877 | ..... | 49,835 | ..... | ..... | ..... | 49,835 |
| 1878 | ..... | 314,904 | ..... | ..... | ..... | 314,904 |
| 1879 | ..... | 280,771 | ..... | ..... | ..... | 280,771 |
| 1880 | ..... | 49,899 | ..... | ..... | ..... | 49,899 |
| 1881 | ..... | 39,710 | ..... | ..... | ..... | 39,710 |
| 1882 | ..... | 178,779 | ..... | ..... | ..... | 178,779 |
| 1883 | ..... | 43,108 | ..... | ..... | ..... | 43,108 |
| 1884 | ..... | 135,156 | ..... | ..... | ..... | 135,156 |
| 1885 | ..... | 123,466 | ..... | ..... | ..... | 123,466 |
| December 31— | | | | | | |
| 1886 | ..... | 136,666 | ..... | ..... | ..... | 136,666 |
| 1887 | ..... | 140,065 | ..... | ..... | ..... | 140,065 |
| 1888 | ..... | 194,216 | ..... | ..... | ..... | 194,216 |
| 1889 | ..... | 161,614 | ..... | ..... | ..... | 161,614 |
| 1890 | ..... | 181,030 | ..... | ..... | ..... | 181,030 |
| 1891 | ..... | 173,887 | ..... | ..... | ..... | 173,887 |
| 1892 | ..... | 154,375 | ..... | ..... | ..... | 154,375 |
| 1893 | ..... | 508,090 | ..... | ..... | ..... | 508,090 |
| 1894 | ..... | 456,753 | ..... | ..... | [a] 41,240 | 497,993 |
| 1895 | ..... | 164,083 | ..... | 1,696,879 | 50,773 | 214,856 |
| 1896 | ..... | 164,877 | ..... | [b] 16,359,452 | 442,496 | 607,373 |
| 1897 | 150,473 | 210,282 | ..... | [b] 7,725,624 | 223,037 | 433,319 |

[a] Not enumerated between 1868 and July 1, 1894.
[b] Part of this is foreign lead returned by collectors of customs by mistake as domestic lead.

The following table, compiled from monthly reports of the Bureau of Statistics, shows the warehouse transactions in lead ore and base bullion during half-yearly periods from July 1, 1896, to July 1, 1898:

*Warehouse transactions of lead in ore and base bullion.*

| Customs districts. | In warehouse first day of half year. | Entered warehouse. | | Additions by liquidation. | Withdrawn from warehouse. | | | Deductions by liquidation. | In warehouse close of half year. |
|---|---|---|---|---|---|---|---|---|---|
| | | Direct importation. | From other districts. | | For exportation. | For transportation. | For consumption. | | |
| *Second half 1896.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Arizona | | 842,471 | | | | 842,471 | | | |
| Corpus Christi | | 731,384 | | | | 731,384 | | | |
| Denver | | | 749,725 | | | | 749,725 | | |
| Galveston | | | 934,692 | | 934,692 | | | | |
| Kansas City | 827,398 | | 9,061,201 | | | 9,602,103 | | | 286,496 |
| Montana and Idaho | | 2,398,554 | 160,826 | 25,546 | | | 2,555,888 | 28,946 | |
| Newark | 4,985,365 | | 11,856,601 | | 13,967,111 | | 436,897 | 752,963 | 2,684,995 |
| Newport News | | | 9,415,780 | | 9,415,780 | | | | |
| Omaha | | | 14,000 | | | | 14,000 | | |
| Paso del Norte | 1,024,825 | 8,594,243 | 1,174,534 | | | 9,124,995 | 1,134,779 | | 533,828 |
| Perth Amboy | 3,185,812 | | 31,565,326 | 161,613 | 29,266,965 | 400,236 | 548,222 | 1,374,222 | 3,323,106 |
| Puget Sound | | 2,341,375 | | | | 2,341,375 | | | |
| Pittsburg | 497,535 | 11,087,533 | | | | 10,452,461 | 289,500 | | 843,107 |
| Saluria, Tex | | 5,694,002 | | | | 5,694,002 | | | |
| Chicago | 564,148 | | 133,733 | 12,505 | | 710,386 | | | |
| New York | 160,184 | 39,162,777 | 1,375,045 | | 255,916 | 39,162,777 | 1,119,129 | | 160,184 |
| San Francisco | 387,189 | 251,770 | | 17,046 | 83,074 | | 97,764 | 57,752 | 416,415 |
| Total | 11,632,456 | 71,104,109 | 66,441,463 | 216,710 | 53,923,538 | 79,062,190 | 6,945,904 | 2,213,883 | 8,248,131 |

*Warehouse transactions of lead in ore and base bullion*—Continued.

| Customs districts. | In warehouse first day of half year. | Entered warehouse. | | Additions by liquidation. | Withdrawn from warehouse. | | | Deductions by liquidation. | In warehouse close of half year. |
|---|---|---|---|---|---|---|---|---|---|
| | | Direct importation. | From other districts. | | For exportation. | For transportation. | For consumption. | | |
| *First half 1897.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Arizona | | 770,150 | | | | 770,150 | | | |
| Corpus Christi | | 541,471 | | | | 541,471 | | | |
| Denver | | 33,590 | 5,012,140 | | 2,703,203 | 2,342,527 | | | |
| Galveston | | | 438,247 | | 438,247 | | | | |
| Kansas City | 286,496 | 33,160 | 5,621,858 | 958 | | 2,684,053 | 2,754,606 | | 503,813 |
| Montana and Idaho | | 169,084 | 232,750 | | | | 401,834 | | |
| Newark | 2,684,995 | | 22,278,763 | 2 | 17,768,997 | | 4,860,935 | 812,378 | 1,521,450 |
| Newport News | | | 3,475,256 | | 3,475,256 | | | | |
| Omaha | | | 975,681 | | | | 975,681 | | |
| Paso del Norte | 533,826 | 6,086,101 | 769,361 | | | 5,514,775 | 615,410 | | 1,259,105 |
| Perth Amboy | 3,323,106 | | 32,901,315 | | 29,443,598 | | 2,470,497 | 1,812,397 | 2,497,929 |
| Puget Sound | | 8,854,347 | | | | 8,854,347 | | | |
| Pittsburg | 843,107 | 3,485,729 | | 153,085 | | 4,082,100 | 399,821 | | |
| Saluria | | 3,687,134 | | | | 3,687,134 | | | |
| Chicago | | | 141,900 | | | 139,083 | | 2,817 | |
| New York | 160,184 | 50,494,317 | 300,166 | | | 50,494,317 | 454,088 | | 6,262 |
| San Francisco | 416,415 | 1,095,986 | 70 | 5,116 | 366,000 | | 229,049 | 26,436 | 896,102 |
| Total | 8,248,129 | 75,251,069 | 72,147,507 | 159,161 | 54,195,301 | 79,109,957 | 13,161,921 | 2,654,028 | 6,684,661 |

*Warehouse transactions of lead in ore and base bullion*—Continued.

| Customs districts. | In warehouse first day of half year. | Entered warehouse. | | Additions by liquidation. | Withdrawn from warehouse. | | | Deductions by liquidation. | In warehouse close of half year. |
|---|---|---|---|---|---|---|---|---|---|
| | | Direct importation. | From other districts. | | For exportation. | For transportation. | For consumption. | | |
| *Second half 1897.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Arizona | | 525,421 | | | | 525,421 | | | |
| Corpus Christi | | 827,711 | | | | 827,711 | | | |
| Denver | | | 11,725,362 | | | 11,725,362 | | | |
| Galveston | | | 4,767,957 | | 4,767,957 | | | | |
| Kansas City | 563,813 | 1,120,241 | 5,202,223 | 24,468 | | 5,246,765 | 503,784 | | 1,100,196 |
| Montana and Idaho | | 1,497,484 | 37,530 | | | | 1,535,014 | | |
| Newark | 1,521,450 | | 28,104,335 | | 18,351,479 | | 4,091,560 | 2,173,885 | 5,008,861 |
| Newport News | | | 3,365,254, | | 3,365,254 | | | | |
| Omaha | | 2,407,861 | 2,045,619 | | | 2,015,220 | 1,051,400 | | 1,386,860 |
| Paso del Norte | 1,259,105 | 8,092,551 | 1,941,822 | | | 8,408,334 | 2,032,639 | | 852,505 |
| Perth Amboy | 2,497,929 | | 33,999,644 | | 28,246,242 | | 1,447,951 | 2,845,387 | 3,957,993 |
| Puget Sound | | 15,655,524 | | | | 15,655,524 | | | |
| Saluria | | 5,836,847 | | | | 5,836,847 | | | |
| Chicago | | | 716,816 | 29,449 | 249,067 | | 105,300 | 48,540 | 343,338 |
| New York | 6,262 | 51,687,838 | 1,967,482 | | | 53,655,320 | | | 6,262 |
| San Francisco | 896,102 | 463,080 | | 92,784 | 671,856 | | | 47,753 | 732,357 |
| Total | 6,684,661 | 88,114,558 | 95,816,066 | 146,701 | 55,651,855 | 103,896,504 | 10,767,648 | 5,115,565 | 13,388,372 |

*Warehouse transactions of lead in ore and base bullion*—Continued.

| Customs districts. | In warehouse first day of half year. | Entered warehouse. | | Additions by liquidation. | Withdrawn from warehouse. | | | Deductions by liquidation. | In warehouse close of half year. |
|---|---|---|---|---|---|---|---|---|---|
| | | Direct importation. | From other districts. | | For exportation. | For transportation. | For consumption. | | |
| *First half 1898.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* | *Pounds.* |
| Arizona | | 1,214,635 | | | | 1,214,635 | | | |
| Corpus Christi | | 684,188 | | | | 684,188 | | | |
| Denver | | | 6,755,787 | | 224,000 | 5,469,287 | | | 1,469,179 |
| Galveston | | | 6,991,093 | | 6,991,093 | | | | |
| Detroit | | | 1,468,179 | | 1,468,179 | | | | |
| Huron | | | 25,070 | | 25,070 | | | | |
| Kansas City | 1,100,196 | | 1,574,845 | | | 2,556,439 | 42,372 | | 76,230 |
| Minnesota | | 53,550 | | | | 53,550 | | | |
| Montana and Idaho | | | 178,547 | | | | 13,142 | | 165,405 |
| Newark | 5,008,861 | | 32,377,456 | | 31,077,971 | | 1,097,164 | 3,223,207 | 1,987,975 |
| Newport News | | | 1,904,615 | | 1,904,615 | | | | |
| Omaha | 1,386,860 | 3,107,006 | 11,737 | 235,054 | 745,077 | 3,668,425 | | 181,180 | 145,975 |
| Paso del Norte | 852,505 | 8,639,700 | 5,012,494 | | | 8,043,955 | 2,103,808 | 3,330,541 | 1,026,395 |
| Perth Amboy | 3,957,993 | 7,751,343 | 29,570,099 | 152,898 | 30,818,598 | | 370,648 | 7,171,731 | 3,071,356 |
| Puget Sound | | 6,964,091 | | | | 6,964,091 | | | |
| Saluria | | 5,852,753 | | | | 5,852,753 | | | |
| Chicago | 343,338 | 215,172 | 1,674,012 | 137,101 | 1,598,686 | 533,820 | | 62,348 | 174,799 |
| New York | 6,262 | 44,504,319 | 5,268,297 | | 896,000 | 48,875,044 | | | 7,834 |
| San Francisco | 732,357 | 698,096 | | 61,244 | 973,122 | | 3,836 | 99,076 | 415,653 |
| Total | 13,388,372 | 79,685,853 | 92,812,261 | 586,297 | 76,722,311 | 83,916,187 | 3,630,970 | 14,068,083 | 8,540,801 |

## DOMESTIC PRODUCERS.

An increasing quantity of ores from the southeastern Missouri district is handled by outside smelters, in contrast with the former method when local ores were locally treated. The greater part of the ores and furnace products shipped from the mines goes to the St. Louis Smelting and Refining Company and the Missouri Smelting Company, both at Cheltenham, Missouri, near St. Louis. The pig-lead product of the mining companies therefore no longer represents the metal output of the district. In 1897 the total local pig-lead production of the St. Joseph Lead Company, the Mine la Motte estate, the Desloge Consolidated Lead Company, and the Central Lead Company aggregated 31,231 short tons. The National Lead Company has lately acquired property in this district, the development of which promises to lead to a further increase.

From the Joplin-Galena district the desilverizers and the St. Louis lead smelters are drawing increasing percentages of the lead ore mined, although some additional local lead-smelting plants have been established in recent years. Local returns of the aggregate weekly lead sales show that there were marketed—which is practically identical with mined—30,825 short tons of lead ore and concentrates, the highest record yet reached. The Joplin Herald has collected monthly reports of sales from the different camps of southwest Missouri and southeast Kansas for the first six months of 1898, which show the following aggregates:

*Output of camps, southwest Missouri and southeast Kansas, for the first six months of 1898.*

| Camp. | Zinc ore. | Lead ore. | Total value. |
|---|---|---|---|
| | *Short tons.* | *Short tons.* | |
| Joplin | 18,120 | 4,446 | $639,427 |
| Carterville | 11,948 | 2,563 | 381,286 |
| Duenweg | 7,288 | 1,327 | 217,816 |
| Webb City | 7,427 | 391 | 184,530 |
| Oronogo | 7,418 | 206 | 188,627 |
| Galena, Kansas | 38,792 | 4,657 | 1,086,868 |
| Stotts City | 3,005 | 66 | 78,326 |
| Aurora | 9,274 | 270 | 173,947 |
| Carthage | 1,778 | ..... | 30,784 |
| Central City | 3,034 | 303 | 98,041 |
| Belleville | 497 | 20 | 13,207 |
| Springfield | 420 | 39 | 11,694 |
| Sundries | 919 | 201 | 21,695 |
| Total | 109,920 | 14,489 | 3,126,248 |

The principal gain in the production of lead has taken place in Idaho, by far the greater part of the total being from the Cœur d'Alene district, which now overshadows every other one. It is the principal reliance of the majority of the great smelters of Denver and of Pueblo, Colorado, and also of some Montana and Washington smelters.

As showing from what widely scattered sources material is drawn, the following table is presented, giving the lead contents of the ores smelted by what are generally known as the valley smelters—those at Denver and Pueblo, Colorado:

*Source of lead in ores smelted by valley smelters in 1897.*

| | Pounds. | | Pounds. |
|---|---|---|---|
| Colorado | 55,850,292 | California | 209,243 |
| Idaho | 70,236,742 | New Mexico | 809,019 |
| Utah | 22,708,918 | Nevada | 53,277 |
| Montana | 3,597,023 | Missouri and Kansas | 895,696 |
| Arizona | 1,330,155 | Mexico and Canada | 17,841,602 |

The Colorado lead product declined further in 1897 owing to the strike of the miners at Leadville. The Herald-Democrat of Leadville compiles statistics showing that the lead contents of ores smelted by Leadville and outside smelters in 1897 aggregated 13,278 short tons. In 1895 the estimate was 31,236. This shows that the yield of lead from ores mined in other camps must have increased very considerably.

## PRICES.

The following table gives the highest and lowest prices monthly for a series of years, compiled from market quotations:

*Highest and lowest prices of lead at New York City, monthly, from 1870 to 1897, inclusive.*

[Cents per pound.]

| Year. | January. | | February. | | March. | | April. | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1870 | a 6.30 | 6.20 | 6.25 | 6.17 | 6.20 | 6.10 | 6.25 | 6.15 |
| 1871 | a 6.30 | 6.15 | 6.25 | 6.20 | 6.20 | 6.15 | 6.20 | 6.10 |
| 1872 | a 6 | 5.90 | 6 | 5.87 | 6 | 5.87 | 6.12 | 5.90 |
| 1873 | a 6.37 | 6.25 | 6.50 | 6.40 | 6.50 | 6.25 | 6.50 | 6.25 |
| 1874 | a 6 | 5.90 | 6.25 | 6 | 6.25 | 6.12 | 6.25 | 5.90 |
| 1875 | a 6.20 | 6 | 5.90 | 5.85 | 5.75 | 5.62 | 5.87 | 5.80 |
| 1876 | a 6 | 5.87 | 6.37 | 6 | 6.50 | 6.40 | 6.40 | 6.12 |
| 1877 | b 6.15 | 6.12 | 6.40 | 6.20 | 6.75 | 6.50 | 6.50 | 6.25 |
| 1878 | 4.35 | 4 | 3.87 | 3.65 | 3.87 | 3.62 | 3.75 | 3.50 |
| 1879 | 4.50 | 4 | 4.50 | 4.50 | 4.50 | 3.25 | 3.25 | 2.87 |
| 1880 | 6.10 | 5.50 | 6 | 5.87 | 5.95 | 5.30 | 5.75 | 5.40 |
| 1881 | 5 | 4.30 | 5.10 | 4.80 | 4.85 | 4.62 | 4.85 | 4.37 |
| 1882 | 5.15 | 4.95 | 5.20 | 5 | 5.12 | 4.85 | 5 | 4.90 |
| 1883 | 4.70 | 4.60 | 4.60 | 4.50 | 4.65 | 4.50 | 4.62 | 4.40 |
| 1884 | 4.50 | 3.75 | 4.10 | 3.75 | 4.15 | 4.10 | 4.05 | 3.62½ |
| 1885 | 3.70 | 3.55 | 3.70 | 3.60 | 3.70 | 3.62½ | 3.70 | 3.62½ |
| 1886 | 4.70 | 4.50 | 4.90 | 4.60 | 4.95 | 4.85 | 4.90 | 4.65 |
| 1887 | 4.45 | 4.15 | 4.50 | 4.25 | 4.45 | 4.25 | 4.32½ | 4.20 |
| 1888 | 4.90 | 4.50 | 5.15 | 4.60 | 5.25 | 5 | 5.05 | 4.55 |
| 1889 | 3.90 | 3.75 | 3.75 | 3.60 | 3.75 | 3.65 | 3.67½ | 3.60 |
| 1890 | 3.85 | 3.80 | 3.85 | 3.75 | 3.95 | 3.85 | 4.07½ | 3.85 |
| 1891 | 4.50 | 4.05 | 4.50 | 4.25 | 4.37½ | 4.25 | 4.32½ | 4.10 |
| 1892 | 4.30 | 4.10 | 4.25 | 4.05 | 4.22½ | 4.10 | 4.30 | 4.20 |
| 1893 | 3.90 | 3.85 | 3.95 | 3.90 | 4.05 | 3.85 | 4.12½ | 4.05 |
| 1894 | 3.25 | 3.15 | 3.35 | 3.20 | 3.45 | 3.25 | 3.45 | 3.37½ |
| 1895 | 3.12½ | 3.05 | 3.12½ | 3.07½ | 3.10 | 3.07½ | 3.12½ | 3.05 |
| 1896 | 3.15 | 3 | 3.20 | 3.07½ | 3.22½ | 3.07½ | 3.07½ | 3.02½ |
| 1897 | 3.12½ | 3.02½ | 3.37½ | 3.12½ | 3.40 | 3.35 | 3.40 | 3.25 |

*a* Gold. *b* Currency.

*Highest and lowest prices of lead at New York City, monthly, from 1870 to 1897, inclusive*—Continued.

[Cents per pound.]

| Year. | May. | | June. | | July. | | August. | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1870 | 6.25 | 6.20 | 6.25 | 6.20 | 6.30 | 6.20 | 6.37 | 6.32 |
| 1871 | 6.18 | 6.10 | 6.15 | 6.12 | 6.15 | 6.10 | 6.12 | 6 |
| 1872 | 6.62 | 6.25 | 6.62 | 6.40 | 6.62 | 6.40 | 6.50 | 6.40 |
| 1873 | 6.62 | 6.35 | 6.55 | 6.12 | 6.12 | 6 | 6.25 | 6 |
| 1874 | 6 | 5.75 | 6 | 5.62 | 5.80 | 5.62 | 5.80 | 5.65 |
| 1875 | 5.95 | 5.90 | 5.90 | 5.75 | 6 | 5.95 | 5.95 | 5.87 |
| 1876 | 6.50 | 6.10 | 6.50 | 6.25 | 6.35 | 6.20 | 6.37 | 6.25 |
| 1877 | 6 | 5.55 | 5.70 | 5.60 | 5.60 | 5.37 | 5.12 | 4.90 |
| 1878 | 3.50 | 3.25 | 3.50 | 3.12 | 3.62 | 3.25 | 3.50 | 3.20 |
| 1879 | 3.12 | 2.87 | 3.80 | 3.12 | 4.10 | 3.90 | 4.05 | 4 |
| 1880 | 5.25 | 4.40 | 4.75 | 4.50 | 4.75 | 4.25 | 5 | 4.30 |
| 1881 | 4.70 | 4.25 | 4.50 | 4.25 | 4.90 | 4.50 | 4.95 | 4.75 |
| 1882 | 4.85 | 4.60 | 4.90 | 4.55 | 5.15 | 4.90 | 5.10 | 4.95 |
| 1883 | 4.55 | 4.40 | 4.45 | 4.40 | 4.40 | 4.30 | 4.30 | 4.20 |
| 1884 | 3.75 | 3.52½ | 3.65 | 3.57½ | 3.70 | 3.55 | 3.70 | 3.52½ |
| 1885 | 3.75 | 3.60 | 3.85 | 3.62½ | 4.15 | 3.87½ | 4.25 | 4.12 |
| 1886 | 4.75 | 4.65 | 4.90 | 4.65 | 4.90 | 4.75 | 4.80 | 4.75 |
| 1887 | 4.70 | 4.30 | 4.70 | 4.50 | 4.67½ | 4.40 | 4.62½ | 4.55 |
| 1888 | 4.62½ | 4 | 4.10 | 3.65 | 4.07½ | 3.85 | 4.97½ | 4.15 |
| 1889 | 3.87½ | 3.60 | 4.05 | 3.90 | 4.05 | 3.80 | 3.95 | 3.75 |
| 1890 | 4.35 | 4 | 4.50 | 4.25 | 4.50 | 4.40 | 4.72½ | 4.35 |
| 1891 | 4.37½ | 4.20 | 4.50 | 4.35 | 4.45 | 4.30 | 4.53 | 4.40 |
| 1892 | 4.25 | 4.20 | 4.20 | 4.05 | 4.25 | 4 | 4.15 | 4 |
| 1893 | 4 | 3.75 | 3.90 | 3.45 | 3.60 | 3.30 | 3.75 | 3.25 |
| 1894 | 3.40 | 3.30 | 3.37½ | 3.25 | 3.65 | 3.37½ | 3.70 | 3.30 |
| 1895 | 3.25 | 3.07½ | 3.30 | 3.25 | 3.50 | 3.30 | 3.55 | 3.50 |
| 1896 | 3.05 | 3 | 3.05 | 3 | 3 | 2.90 | 2.90 | 2 65 |
| 1897 | 3.37½ | 3.22½ | 3.60 | 3.25 | 3.90 | 3.65 | 4.10 | 3.70 |

*Highest and lowest prices of lead at New York City, monthly, from 1870 to 1897, inclusive*—Continued.

[Cents per pound.]

| Year. | September. | | October. | | November. | | December. | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1870 | 6.37 | 6.30 | 6.37 | 6.25 | 6.35 | 6.20 | 6.35 | 6.25 |
| 1871 | 6.10 | 6 | 6 | 5.87 | 6 | 5.90 | 6 | 5.75 |
| 1872 | 6.50 | 6.30 | 6.62 | 6.40 | 6.60 | 6.50 | 6.60 | 6.42 |
| 1873 | 6.62 | 6.37 | 6.75 | 6.25 | 6.50 | 6 | 6.12 | 6 |
| 1874 | 6.10 | 5.65 | 6.35 | 6.10 | 6.50 | 6.25 | 6.40 | 6.12 |
| 1875 | 5.87 | 5.70 | 5.65 | 5.60 | 5.87 | 5.65 | 5.95 | 5.87 |
| 1876 | 6.25 | 6 | 6 | 5.80 | 5.80 | 5.70 | 5.70 | 5.65 |
| 1877 | 4.85 | 4.75 | 4.85 | 4.25 | 4.75 | 4.50 | 4.60 | 4.50 |
| 1878 | 3.45 | 3.25 | 3.60 | 3.37 | 3.95 | 3.60 | 4 | 3.90 |
| 1879 | 4 | 3.75 | 5.50 | 4 | 5.62 | 5 | 5.60 | 5.50 |
| 1880 | 4.90 | 4.80 | 4.87 | 4.65 | 4.85 | 4.75 | 4.75 | 4.25 |
| 1881 | 5.37 | 4.95 | 5.25 | 4.87 | 5.25 | 4.90 | 5.25 | 5 |
| 1882 | 5.15 | 4.95 | 5.15 | 4.85 | 4.90 | 4.50 | 4.75 | 4.50 |
| 1883 | 4.32 | 4.30 | 4.32 | 4.12 | 4.05 | 3.65 | 3.75 | 3.60 |
| 1884 | 3.75 | 3.55 | 3.75 | 3.60 | 3.55 | 3.37½ | 3.75 | 3.50 |
| 1885 | 4.25 | 4 | 4.25 | 4 | 4.60 | 4 | 4.67½ | 4.50 |
| 1886 | 4.70 | 4.45 | 4.30 | 4 | 4.40 | 4.10 | 4.35 | 4.25 |
| 1887 | 4.55 | 4.25 | 4.40 | 4.20 | 4.75 | 4.25 | 5.15 | 4.90 |
| 1888 | 5.12½ | 4.90 | 5.12½ | 3.62½ | 3.82½ | 3.60 | 3.82½ | 3.60 |
| 1889 | 4 | 3.85 | 3.90 | 3.75 | 3.90 | 3.75 | 3.90 | 3.75 |
| 1890 | 5 | 4.67½ | 5.25 | 5 | 5.25 | 4.60 | 4.60 | 4.05 |
| 1891 | 4.55 | 4.40 | 4.55 | 4.10 | 4.35 | 4.10 | 4.25 | 4.25 |
| 1892 | 4.15 | 4 | 3.95 | 3.85 | 3.85 | 3.70 | 3.85 | 3.70 |
| 1893 | 3.95 | 3.75 | 3.75 | 3.25 | 3.37½ | 3.30 | 3.30 | 3.20 |
| 1894 | 3.30 | 3.10 | 3.15 | 3.05 | 3.12½ | 3.10 | 3.12½ | 3.02½ |
| 1895 | 3.45 | 3.32½ | 3.35 | 3.30 | 3.27½ | 3.15 | 3.30 | 3.20 |
| 1896 | 2.80 | 2.72½ | 2.92½ | 2.72½ | 3.05 | 2.85 | 3.05 | 2.95 |
| 1897 | 4.35 | 4.25 | 4.25 | 3.85 | 3.85 | 3.75 | 3.75 | 3.65 |

## THE LEAD MARKET.

Since the panic of 1893 prices of lead have been very low, and it was only in 1897 that a recovery took place to a level approaching that of former years. The advance has been due largely to the higher rate of duty on lead and lead ores, which was anticipated months before it was actually established. The year opened with the price of lead in New York hovering close to 3 cents, the market improving under quite heavy sales toward the end of January until 3.12½ cents was reached. Buying by consumers and speculators, in anticipation of a higher duty,

carried values up to 3.37½ cents during February, the market quieting down, however, and receding slightly as March approached. In that month a further buying movement carried the market up to 3.40 cents. The delay in the passage of a new tariff law led speculators to realize in April, causing the market to develop a weaker tone, which lasted through the greater part of May, the price receding at one time in that month to 3.22½ cents. With June came a steadier tone, and as the month advanced the volume of buying increased, and the price was carried up to 3.60 cents. July witnessed heavy consumption and speculative buying, culminating with the passage of the tariff act, the price advancing to 3.90 cents. Realizing sales in August led to a moderate reaction to 3.70 cents; but then heavy purchases again carried up the price, the movement continuing well into September, when the maximum price of 4.35 cents was attained. Heavy speculative holdings hung over the market, however, and caused an uneasiness which found expression in a weaker market, relieved by occasional spurts of buying. In October the break came and speculators were forced to unload. This carried the market down to 3.85 cents at the close of October. November brought alternate spells of weakness and resistance to a decline, but in general that month and December witnessed a dull and weak market, under the weight of which the price declined to 3.65 cents.

## WORLD'S PRODUCTION.

An effort to state correctly the lead production of the world is beset by many difficulties. In some countries there are no reliable official statistics whatever. In others the official statistics deal only with the production of lead ores or concentrates, without any reference to their metal contents. Metallurgical statistics, which after all are the only ones of commercial value, are not touched at all. Lead ores are shipped, often in large quantities, to distant countries for smelting, and base bullion travels from the country of origin to distant refineries and desilverizing works. This renders the danger of duplication very great and makes it almost impossible to assign the lead to its actual country of origin. Thus the mineral statistics of Great Britain deal only with the production of dressed lead ore. There is no attempt to present figures relating to the production of refined lead from domestic or foreign sources. The same is true of the Australian colonies.

The only comprehensive effort to deal with these difficulties is that of the Metallgesellschaft of Frankfort-on-the-Main. It must be understood, however, that the figures given for some countries—for Great Britain, for instance—include the estimated contents of the foreign ores imported, and do not deal exclusively with lead obtainable from ores mined in the country.

*The world's production of lead during the years 1886 to 1897.*

[Metric tons.]

| Country. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|---|
| Germany | 91,000 | 95,000 | 97,000 | 100,000 | 101,000 | 95,000 |
| Spain | *a* 102,000 | *a* 119,000 | 129,200 | 136,900 | 140,300 | 145,700 |
| Great Britain | *a* 51,000 | *a* 50,000 | *a* 50,000 | *a* 47,800 | 49,800 | 49,000 |
| Austria | 8,000 | 7,800 | 8,000 | 8,000 | 8,300 | 7,600 |
| Hungary | 2,100 | 1,800 | 2,000 | 2,300 | 1,200 | 2,100 |
| Italy | 19,000 | *a* 19,000 | 17,000 | 18,000 | 17,700 | 18,500 |
| Belgium | 10,000 | 10,000 | 11,000 | 9,400 | 9,600 | 12,700 |
| France | 4,000 | *a* 5,000 | 6,500 | 5,400 | 4,600 | 6,700 |
| Greece | *a* 10,000 | 12,500 | 14,500 | 13,500 | 14,200 | 13,300 |
| Other European countries | *a* 2,000 | *a* 2,000 | *a* 2,000 | *a* 2,000 | *a* 2,000 | *a* 2,000 |
| United States | 119,387 | 132,150 | 137,790 | 141,852 | 130,272 | 161,948 |
| Mexico | 16,000 | 18,100 | 30,100 | 27,500 | 22,300 | 30,200 |
| Australia *b* | *a* 5,000 | *a* 10,000 | *a* 19,000 | *a* 35,000 | 40,500 | 56,000 |
| Other countries | *a* 1,000 | *a* 1,000 | *a* 1,000 | *a* 1,000 | *a* 1,000 | *a* 1,000 |
| Total | 440,487 | 483,350 | 525,090 | 548,652 | 542,772 | 601,748 |

| Country. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| Germany | 98,000 | 95,000 | 101,000 | 111,058 | 113,792 | 118,881 |
| Spain | 152,300 | 157,100 | 152,620 | 160,786 | 167,017 | 170,000 |
| Great Britain | 44,900 | 38,200 | 42,800 | 55,300 | 57,200 | *a* 60,000 |
| Austria | 7,300 | 7,200 | 7,500 | 8,085 | 10,120 | 9,300 |
| Hungary | 2,300 | 2,500 | 2,113 | 2,277 | 1,911 | 1,800 |
| Italy | 22,000 | 19,900 | 19,600 | 20,353 | 20,786 | 20,469 |
| Belgium | 10,100 | 12,000 | 13,500 | 15,573 | 15,300 | 14,834 |
| France | 8,800 | 8,100 | 8,758 | 7,627 | 8,232 | *a* 9,000 |
| Greece | 14,400 | 12,800 | 14,000 | 19,800 | 13,200 | 15,600 |
| Other European countries | *a* 2,500 | *a* 3,000 | *a* 4,000 | *a* 4,000 | *a* 4,000 | *a* 4,000 |
| United States | 157,187 | 147,627 | 147,600 | 154,265 | 170,600 | 192,000 |
| Mexico | 47,500 | 64,000 | 57,000 | 68,000 | 63,000 | 70,000 |
| Canada | ..... | 1,000 | 2,586 | 10,467 | 10,977 | 17,719 |
| Australia *b* | 54,000 | 58,000 | 50,000 | 38,000 | 30,000 | 22,000 |
| Other countries | *a* 1,000 | *a* 1,000 | *a* 1,000 | ..... | ..... | ..... |
| Total | 622,287 | 627,427 | 624,077 | 675,591 | 686,135 | 725,203 |

*a* Estimated. *b* Exclusive of that part of product not exported to Europe and America.

## SPAIN.

During recent years the production of Spain has increased. The following table presents the statistics, by provinces, the figures for 1894, 1895, and 1896 being official, while those for 1897 are the estimate of Ramon Oriol, of the Revista Minera of Madrid:

*Production of lead in Spain, 1894 to 1897.*

| Province. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| | *Metric tons.* | *Metric tons.* | *Metric tons.* | *Metric tons.* |
| Murcia | 85,465 | 79,636 | 81,922 | 90,000 |
| Jaén (Linares) | 31,529 | 38,847 | 36,169 | 40,000 |
| Córdova | 17,795 | 25,260 | 32,971 | 30,000 |
| Almeria | 13,295 | 13,707 | 11,658 | 11,000 |
| Guipúzcoa | 4,536 | 3,336 | 4,297 | 5,000 |
| Total | 152,620 | 160,786 | 167,017 | 176,000 |
| Export pig lead and base bullion | 160,316 | 151,129 | 168,585 | 171,774 |
| Export lead ore | 12,164 | 9,203 | 6,285 | 8,267 |

## GERMANY.

According to official statistics, the production of lead in Germany has been as follows:

*Production of lead in Germany during the years 1884 to 1897.*

| Year. | Metric tons. | Year. | Metric tons. |
|---|---|---|---|
| 1884 | 94,809 | 1891 | 95,615 |
| 1885 | 93,134 | 1892 | 97,742 |
| 1886 | 92,520 | 1893 | 94,659 |
| 1887 | 94,921 | 1894 | 100,751 |
| 1888 | 96,995 | 1895 | 111,058 |
| 1889 | 100,601 | 1896 | 113,792 |
| 1890 | 101,781 | 1897 | 118,881 |

For a number of years the imports of lead have been increasing, while the exports of pig lead have declined. On the other hand, the exports of manufactured lead have developed steadily. The following table shows the exports and imports of pig lead since 1888:

*German imports and exports of lead during the years 1888 to 1897, inclusive.*

| Year. | Imports. | Exports. | Year. | Imports. | Exports. |
|---|---|---|---|---|---|
| | *Metric tons.* | *Metric tons.* | | *Metric tons.* | *Metric tons.* |
| 1888 | 7,358 | 34,889 | 1893 | 23,856 | 23,944 |
| 1889 | 9,527 | 32,793 | 1894 | 24,280 | 24,354 |
| 1890 | 12,766 | 32,115 | 1895 | 28,449 | 27,855 |
| 1891 | 17,624 | 24,973 | 1896 | 33,016 | 24,828 |
| 1892 | 17,500 | 25,657 | 1897 | 35,092 | 24,075 |

In former years German statistics did not separate the figures relating to the export and import movement of copper and lead ores. Since 1896 they have been separately stated. They show that the imports of lead ores, which were 61,472 metric tons in 1896, rose to 88,226 metric tons in 1897, while the exports declined from 2,541 tons in 1896 to 2,106 in 1897. It seems evident that the lead drawn from these sources is counted as a part of the German product. The statistics show that the production of lead ores in Germany declined from 157,504 tons in 1896 to 150,179 tons in 1897; and yet the product of pig lead rose from 113,792 to 118,881 metric tons. In 1893 the ore output was 168,400 tons, and yet the pig lead product was only 94,659 tons.

## THE WORLD'S CONSUMPTION.

The Metallgesellschaft of Frankfort-on-the-Main figures the consumption of lead in the world, as follows:

*World's consumption of lead, 1893 to 1897.*

| Country. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| | *Metric tons.* | *Metric tons.* | *Metric tons.* | *Metric tons.* | *Metric tons.* |
| Germany | 94,571 | 100,678 | 111,652 | 121,980 | 129,898 |
| Great Britain | 178,415 | 161,847 | 170,130 | 196,200 | 202,334 |
| France | 77,065 | 86,160 | 64,657 | 77,773 | 85,819 |
| Austria-Hungary | 15,604 | 18,442 | 19,276 | 18,814 | 16,938 |
| Italy | 19,985 | 19,942 | 18,747 | 20,533 | 18,858 |
| Switzerland | 1,941 | 1,412 | 1,837 | 2,485 | 2,640 |
| Belgium | 23,088 | 21,858 | 16,221 | 18,723 | 20,421 |
| Netherlands | *a* 5,000 | *a* 5,000 | *a* 5,000 | *a* 5,000 | *a* 5,000 |
| Russia | 24,600 | 27,000 | 22,000 | 21,000 | 24,000 |
| Other European countries | 1,500 | 1,700 | 1,600 | 2,800 | *a* 2,800 |
| United States | 179,163 | 173,413 | 218,007 | 179,692 | 205,839 |
| All other countries | 14,700 | 12,300 | 10,600 | 12,100 | 11,500 |
| Total | 635,632 | 629,752 | 659,727 | 677,100 | 726,047 |

*a* Estimated.

The most striking fact is the large increase in the consumption of lead, which is further emphasized when it is considered that it was only 566,703 metric tons in 1890.

# ZINC.

By CHARLES KIRCHHOFF.

## PRODUCTION.

The first half of 1897 brought an improvement in the spelter production which was emphasized during the second half, the year far exceeding the record. To some extent, however, artificial conditions stimulated the output, a group of smelters having formed a combination to maintain prices. This stimulated production from outside sources, which in turn forced the associated producers to unload accumulations of metal into foreign channels. The heavy output was therefore coupled with large exports, the domestic consumption being about the same as in 1895.

For a series of years the production of spelter has been as follows:

*Production of spelter in the United States.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1873 | 7,343 | 1889 | 58,860 |
| 1875 | 15,833 | 1890 | 63,683 |
| 1880 | 23,239 | 1891 | 80,873 |
| 1882 | 33,765 | 1892 | 87,260 |
| 1883 | 36,872 | 1893 | 78,832 |
| 1884 | 38,544 | 1894 | 75,328 |
| 1885 | 40,688 | 1895 | 89,686 |
| 1886 | 42,641 | 1896 | 81,499 |
| 1887 | 50,340 | 1897 | 99,980 |
| 1888 | 55,903 | | |

In the different States the production has been as follows:

*Production of spelter in the United States, by States.*

| Year. | Eastern and Southern States. | Illinois. | Kansas. | Missouri. | Total. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1882 | 5,698 | 18,201 | 7,366 | 2,500 | 33,765 |
| 1883 | 5,340 | 16,792 | 9,010 | 5,730 | 36,872 |
| 1884 | 7,861 | 17,594 | 7,859 | 5,230 | 38,544 |
| 1885 | 8,082 | 19,427 | 8,502 | 4,677 | 40,688 |
| 1886 | 6,762 | 21,077 | 8,932 | 5,870 | 42,641 |
| 1887 | 7,446 | 22,279 | 11,955 | 8,660 | 50,340 |
| 1888 | 9,561 | 22,445 | 10,432 | 13,465 | 55,903 |
| 1889 | 10,265 | 23,860 | 13,658 | 11,077 | 58,860 |
| 1890 | 9,114 | 26,243 | 15,199 | 13,127 | 63,683 |
| 1891 | *a* 8,945<br>*b* 4,217 | 28,711 | 22,747 | 16,253 | 80,873 |
| 1892 | *a* 9,582<br>*b* 4,913 | *c*31,383 | 24,715 | 16,667 | 87,260 |
| 1893 | *a* 8,802<br>*b* 3,882 | *c*29,596 | 22,815 | 13,757 | 78,832 |
| 1894 | *a* 7,400<br>*b* 1,376 | *c*28,972 | 25,588 | 11,992 | 75,328 |
| 1895 | *a* 9,484<br>*b* 3,697 | *c*35,732 | 25,775 | 14,998 | 89,686 |
| 1896 | *a* 8,139<br>*b* 2,427 | *c*36,173 | 20,759 | 14,001 | 81,499 |
| 1897 | *a* 7,218<br>*b* 3,365 | *c*37,876 | 33,396 | 18,125 | 99,980 |

*a* Eastern. *b* Southern. *c* Including Indiana.

The principal gain has been in Kansas and in Missouri, particularly during the second half of the year. The following statement of the production semiannually for a series of years reflects even more closely the fluctuations in the output. It presents a report also for the first half of 1898, which shows that even the high rate of the second half of 1897 was exceeded during the first six months of the current year.

For semiannual periods the production of spelter has been as follows:

*Production of spelter by semiannual periods.*

| States. | First half 1892. | Second half 1892. | First half 1893. | Second half 1893. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Eastern, Southern | 6,901 | 7,594 | 7,380 | 5,304 |
| Illinois and Indiana | 15,483 | 15,900 | 16,427 | 16,169 |
| Kansas | 14,161 | 10,554 | 13,269 | 9,546 |
| Missouri | 8,954 | 7,713 | 8,718 | 5,019 |
| Total | 45,499 | 41,761 | 45,794 | 36,038 |

| States. | First half 1894. | Second half 1894. | First half 1896. | Second half 1896. | First half 1897. | Second half 1897. | First half 1898. |
|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Eastern | 5,064 | 3,712 | 4,517 | 3,622 | 3,866 | 3,352 | 2,955 |
| Southern | | | 1,200 | 1,227. | 1,305 | 2,060 | 1,695 |
| Illinois and Indiana. | 13,392 | 15,580 | 16,305 | 19,868 | 18,054 | 19,822 | 22,129 |
| Kansas | 11,250 | 14,338 | 11,351 | 9,408 | 15,722 | 17,674 | 21,464 |
| Missouri | 6,458 | 5,534 | 5,548 | 8,453 | 7,956 | 10,169 | 10,371 |
| Total | 36,164 | 39,164 | 38,921 | 42,578 | 46,903 | 53,077 | 58,614 |

The first half of 1898 therefore shows a further development in the output, Kansas in particular reaching a very high total.

Capacity for the production of spelter has been considerably increased during 1897, and an additional number of plants have either entered or are preparing to enter the ranks of producers in 1898. In 1897 the Nevada Spelter Company built a large plant. The Robert Lanyon's Sons Spelter Company and Messrs. W. & J. Lanyon erected works at Iola, Kansas, and Matthiessen & Hegeler contemplate building in the same locality. The Midland Coal and Smelting Company, at Midland, Kansas, started new works in 1898. The Swansea Vale Zinc Company has erected one furnace at Sandoval, Illinois, and expects to build others. In August the Robert Lanyon's Sons Spelter Company will have in operation 1,200 retorts at La Harpe, Kansas, and will have from 3,000 to 3,600 retorts running during the coming winter. Mr. S. C. Edgar, owner of the long-established Glendale Zinc Works at St. Louis, Missouri, has begun the erection of a plant of 1,200 retorts at Cherryvale, Kansas, where he has successfully drilled for natural gas. The Humphrey Spelter Company has rebuilt and started the plant at Upland, Indiana, and Messrs. La Tourette & Co. are operating works at Marion, Indiana. In Missouri the Empire Zinc Company added one block to its Joplin works.

The two works at Girard, Kansas, which were under lease to the Cherokee-Lanyon Spelter Company, have passed into the hands of the Cambridge Iron and Steel Company of Cambridge, Ohio, manufacturers of galvanized sheets.

There has therefore been a very notable movement, which is still in progress, toward enlarging capacity. To what extent this constitutes a shifting of the locality of production nearer the ore or the adjacent fuel it is yet too early to estimate. That the movement partakes of that character to some extent is certain.

During recent years the production has outrun domestic consumption and large quantities of spelter have been exported. The consumption of the United States, from the data at hand, may be estimated as follows:

*Consumption of spelter, 1895, 1896, and 1897.*

| | 1895. | 1896. | 1897. |
|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* |
| Production | 89,686 | 81,499 | 99,980 |
| Imports | 432 | 428 | 1,279 |
| Stocks at beginning of year | 4,911 | 5,802 | 7,477 |
| Total supply | 95,029 | 87,729 | 108,736 |
| Deduct— | | | |
| Exports of foreign | ..... | 4 | ..... |
| Exports of domestic | 1,530 | 10,130 | 14,245 |
| Stock at end of year | 5,802 | 7,477 | 5,709 |
| Total | 7,332 | 17,611 | 19,954 |
| Apparent home consumption | 87,697 | 70,118 | 88,782 |

These figures show that home consumption recovered during 1897 from the heavy falling off in 1896. The demand from galvanizers was heavier, the wire trade notably taking large quantities. The brass industry, too, called for larger requirements, while the building trade continued rather dull.

## IMPORTS AND EXPORTS.

*Zinc imported and entered for consumption in the United States, 1867 to 1897.*

| Year ending— | Blocks or pigs. | | Sheets. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quant'ty. | Value. |
| June 30— | *Pounds.* | | *Pounds.* | |
| 1867 | 5,752,611 | $256,366 | 5,142,417 | $311,767 |
| 1868 | 9,327,968 | 417,273 | 3,557,448 | 203,883 |
| 1869 | 13,211,575 | 590,332 | 8,306,723 | 478,646 |
| 1870 | 9,221,121 | 415,497 | 9,542,687 | 509,860 |
| 1871 | 11,159,040 | 508,355 | 7,646,821 | 409,243 |
| 1872 | 11,802,247 | 522,524 | 10,704,944 | 593,885 |
| 1873 | 6,839,897 | 331,399 | 11,122,143 | 715,706 |
| 1874 | 3,593,570 | 203,479 | 6,016,835 | 424,504 |
| 1875 | 2,034,252 | 101,766 | 7,320,713 | 444,539 |
| 1876 | 947,322 | 56,082 | 4,611,360 | 298,308 |
| 1877 | 1,266,894 | 63,250 | 1,341,333 | 81,815 |
| 1878 | 1,270,184 | 57,753 | 1,255,620 | 69,381 |
| 1879 | 1,419,791 | 53,294 | 1,111,225 | 53,050 |
| 1880 | 8,092,620 | 371,920 | 4,069,310 | 210,230 |
| 1881 | 2,859,216 | 125,457 | 2,727,324 | 129,158 |
| 1882 | 18,408,391 | 736,964 | 4,413,042 | 207,032 |
| 1883 | 17,067,211 | 655,503 | 3,309,239 | 141,823 |
| 1884 | 5,869,738 | 208,852 | 952,253 | 36,120 |
| 1885 | 3,515,840 | 113,268 | 1,839,860 | 64,781 |
| December 31— | | | | |
| 1886 | 4,300,830 | 136,138 | 1,092,400 | 40,320 |
| 1887 | 8,387,647 | 276,122 | 926,150 | 32,526 |
| 1888 | 3,825,947 | 146,156 | 295,287 | 12,558 |
| 1889 | 2,052,559 | 77,845 | 1,014,873 | 43,356 |
| 1890 | 1,997,524 | 101,335 | 781,366 | 43,495 |
| 1891 | 808,094 | 41,199 | 21,948 | 1,460 |
| 1892 | 297,969 | 16,520 | 27,272 | 2,216 |
| 1893 | 425,183 | 22,790 | 28,913 | 1,985 |
| 1894 | 387,788 | 13,788 | 39,947 | 2,061 |
| 1895 | 744,301 | 26,782 | 42,513 | 2,773 |
| 1896 | 1,040,719 | 32,096 | 27,321 | 1,358 |
| 1897 | 2,905,451 | 109,520 | 15,971 | 786 |

*Zinc imported and entered for consumption in the United States, 1867 to 1897*—Continued.

| Year ending— | Old. | | Value of manufactures. | Total value. |
|---|---|---|---|---|
| | Quantity. | Value. | | |
| June 30— | *Pounds.* | | | |
| 1867 | | | $1,835 | $569,968 |
| 1868 | | | 1,623 | 622,779 |
| 1869 | | | 2,083 | 1,071,061 |
| 1870 | | | 21,696 | 947,053 |
| 1871 | | | 26,366 | 943,964 |
| 1872 | | | 58,668 | 1,175,077 |
| 1873 | | | 56,813 | 1,103,918 |
| 1874 | | | 48,304 | 676,287 |
| 1875 | | | 26,330 | 572,635 |
| 1876 | | | 18,427 | 372,817 |
| 1877 | | | 2,496 | 147,561 |
| 1878 | | | 4,892 | 132,026 |
| 1879 | | | 3,374 | 109,718 |
| 1880 | | | 3,571 | 585,721 |
| 1881 | | | 7,603 | 262,218 |
| 1882 | | | 4,940 | 948,936 |
| 1883 | | | 5,606 | 802,932 |
| 1884 | | | 4,795 | 249,767 |
| 1885 | | | 2,054 | 180,103 |
| December 31— | | | | |
| 1886 | | | 9,162 | 185,620 |
| 1887 | | | 11,329 | 319,977 |
| 1888 | | | 12,080 | 170,794 |
| 1889 | | | 19,580 | 140,781 |
| 1890 | | | 9,740 | 154,570 |
| 1891 | | | | 42,659 |
| 1892 | 115,293 | $6,556 | 20,677 | 45,969 |
| 1893 | 265 | 21 | 16,479 | 41,275 |
| 1894 | 27,754 | 530 | 11,816 | 28,195 |
| 1895 | 64,398 | 899 | 9,953 | 40,407 |
| 1896 | 14,855 | 267 | 9,800 | 43,521 |
| 1897 | 41,643 | 886 | 11,459 | 122,651 |

*Imports of zinc oxide from 1885 to 1897.*

| Year ending— | Dry. | In oil. | Year ending— | Dry. | In oil. |
|---|---|---|---|---|---|
| | *Pounds.* | *Pounds.* | December 31— | *Pounds.* | *Pounds.* |
| June 30, 1885 | 2,233,128 | 98,566 | 1891 | 2,839,351 | 128,140 |
| December 31— | | | 1892 | 2,442,014 | 111,190 |
| 1886 | 3,526,289 | 79,788 | 1893 | 3,900,749 | 254,807 |
| 1887 | 4,961,080 | 123,216 | 1894 | 3,371,292 | 59,291 |
| 1888 | 1,401,342 | 51,985 | 1895 | 4,546,049 | 129,343 |
| 1889 | 2,686,861 | 66,240 | 1896 | 4,572,781 | 311,023 |
| 1890 | 2,631,458 | 102,298 | 1897 | 5,564,763 | 502,357 |

*Exports of zinc and zinc ore of domestic production, 1864 to 1897.*

| Year ending— | Ore or oxide. | | Plates, sheets, pigs, or bars. | | Value of manufactures. | Total value. |
|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | | |
| June 30— | *Owt.* | | *Pounds.* | | | |
| 1864..... | 14,810 | $116,431 | 95,738 | $12,269 | ..... | $128,700 |
| 1865..... | 99,371 | 114,149 | 184,183 | 22,740 | ..... | 136,889 |
| 1866..... | 4,485 | 25,091 | 140,798 | 13,290 | ..... | 38,381 |
| 1867..... | 3,676 | 32,041 | 312,227 | 30,587 | ..... | 62,628 |
| 1868..... | 8,344 | 74,706 | 1,022,699 | 68,214 | ..... | 142,920 |
| 1869..... | ..... | 65,411 | ..... | ..... | ..... | 65,411 |
| 1870..... | 15,286 | 81,487 | 110,157 | 10,672 | ..... | 92,159 |
| 1871..... | 9,621 | 48,292 | 76,380 | 7,823 | ..... | 56,115 |
| 1872..... | 3,686 | 20,880 | 62,919 | 5,726 | ..... | 26,606 |
| 1873..... | 234 | 2,304 | 73,953 | 4,656 | ..... | 6,960 |
| 1874..... | 2,550 | 20,037 | 43,566 | 3,612 | ..... | 23,649 |
| 1875..... | 3,083 | 20,659 | 38,090 | 4,245 | $1,000 | 25,904 |
| 1876..... | 10,178 | 66,259 | 134,542 | 11,651 | 4,333 | 82,243 |
| 1877..... | 6,428 | 34,468 | 1,419,922 | 115,122 | 1,118 | 150,708 |
| 1878..... | 16,050 | 83,831 | 2,545,320 | 216,580 | 567 | 300,978 |
| 1879..... | 10,660 | 40,399 | 2,132,949 | 170,654 | ..... | 211,053 |
| 1880..... | 13,024 | 42,036 | 1,368,302 | 119,264 | ..... | 161,300 |
| 1881..... | 11,390 | 16,405 | 1,491,786 | 132,805 | 168 | 149,378 |
| 1882..... | 10,904 | 13,736 | 1,489,552 | 124,638 | ..... | 138,374 |
| 1883..... | 3,045 | 11,509 | 852,333 | 70,981 | 734 | 83,224 |
| 1884..... | 4,780 | 16,685 | 126,043 | 9,576 | 4,666 | 30,927 |
| 1885..... | 6,840 | 22,824 | 101,685 | 7,270 | 4,991 | 35,085 |
| December 31— | | | | | | |
| 1886..... | 26,620 | 49,455 | 917,229 | 75,192 | 13,526 | 138,173 |
| 1887..... | 4,700 | 17,286 | 136,670 | 9,017 | 16,789 | 43,092 |
| 1888..... | 4,560 | 18,034 | 62,234 | 4,270 | 19,098 | 41,402 |
| 1889..... | 26,760 | 73,802 | 879,785 | 44,049 | 35,732 | 153,583 |
| 1890..... | 77,360 | 195,113 | 3,295,584 | 126,291 | 23,587 | 344,991 |
| 1891..... | 115,820 | 149,435 | 4,294,656 | 278,182 | 38,921 | 466,538 |
| 1892..... | 18,380 | 41,186 | 12,494,335 | 669,549 | 166,794 | 877,529 |
| 1893..... | 980 | 1,271 | 7,446,934 | 413,673 | 224,787 | 639,731 |
| 1894..... | ..... | 5 | 3,607,050 | 144,074 | 99,406 | 243,485 |
| 1895..... | 480 | 1,008 | 3,060,805 | 153,175 | 50,051 | 204,234 |
| 1896..... | 41,500 | 47,408 | 20,260,169 | 1,013,620 | 51,001 | 1,112,029 |
| 1897..... | 165,200 | 211,350 | 28,490,662 | 1,356,538 | 71,021 | 1,638,909 |

The following table shows the exports of zinc ore and of spelter during the calendar year 1897, grouped first by customs districts and secondly by countries of destination:

*Domestic exports of zinc for calendar year 1897.*

| | Zinc. | | | |
|---|---|---|---|---|
| | Ore. | | Pigs, bars, plates, and sheets. | |
| *Customs districts.* | *Tons.* | | *Pounds.* | |
| Baltimore, Maryland | ..... | ..... | 137,909 | $8,277 |
| Boston and Charlestown, Massachusetts | ..... | ..... | 24,063 | 1,219 |
| Newport News, Virginia | ..... | ..... | 443,286 | 18,696 |
| New York, New York | 6,869 | $159,970 | 1,197,421 | 57,433 |
| Galveston, Texas | ..... | ..... | 12,791,077 | 561,969 |
| Mobile, Alabama | ..... | ..... | 732 | 51 |
| New Orleans, Louisiana | 1,391 | 51,380 | 13,655,472 | 696,196 |
| Arizona | ..... | ..... | 16,060 | 944 |
| Los Angeles, California | ..... | ..... | 120 | 13 |
| San Diego, California | ..... | ..... | 800 | 76 |
| Detroit, Michigan | ..... | ..... | 146,200 | 7,025 |
| Huron, Michigan | ..... | ..... | 47.261 | 3,311 |
| Miami, Ohio | ..... | ..... | 30,050 | 1,300 |
| Vermont | ..... | ..... | 161 | 28 |
| Total | 8,260 | 211,350 | 28,490,612 | 1,356,538 |
| *Countries.* | | | | |
| Austria-Hungary | ..... | ..... | 24,927 | 1,047 |
| Belgium | 516 | 15,840 | ..... | ..... |
| France | ..... | ..... | 257,753 | 10,005 |
| Netherlands | 7,250 | 175,510 | ..... | ..... |
| United Kingdom (England) | 494 | 20,000 | 27,163,091 | 1,300,785 |
| Quebec, Ontario, etc | ..... | ..... | 193,262 | 10,364 |
| Mexico | ..... | ..... | 51,366 | 2,682 |
| All other countries | ..... | ..... | 800,213 | 31,655 |
| Total | 8,260 | 211,350 | 28,490,612 | 1,356,538 |

The ore shipped from New York is the product of New Jersey mines, which goes to the Netherlands in transit to Germany and to Belgium, where it is used for special requirements. The ore shipped via New Orleans is from southwest Missouri and southeast Kansas. The spelter exported from Baltimore, Newport News, and New York is the high-grade metal made in the Eastern and Southern States, and is purchased abroad for the manufacture of brass of the highest quality, chiefly in the manufacture of cartridges. The ordinary spelter made in the West finds its outlet chiefly through the ports of Galveston and New Orleans, practically all of it going to the United Kingdom. A part is distributed from the United Kingdom to other foreign countries.

The principal source of supply of zinc ore in the United States is the Joplin-Galena district of southwest Missouri and southeast Kansas. Local statistics show that the output was 89,300 tons in 1888, which rose to 98,440 tons in 1889 and 114,900 tons in 1890. In 1892 a product of 148,150 tons was reached. In 1896 the product was 147,588, but in 1897 it attained the maximum of 181,535 tons, the Galena district furnishing increasing quantities.

## PRICES.

January developed weakness in the spelter market, prices declining to 3.90 cents toward the end of the month. February, however, opened better, with an advancing tendency which was carried well through March and into April. Then cutting prices again became a feature. In May the metal recovered under a better demand. June, July, and August showed only small fluctuations under the influence of an understanding among some of the leading makers of spelter in the West. These producers attempted to establish prices in the home markets at the same time forcing sales for export when demanded by the exigencies of the situation. A rupture came in November, however, causing demoralization, and low prices prevailed during the closing months of the year.

The following table summarizes the prices of spelter since 1875:

*Price of common Western spelter in New York City, 1875 to 1897.*

[Cents per pound; figures in parentheses are combination prices.]

| Year. | January. | | February. | | March. | | April. | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1875 | 6.75 | 6.37 | 6.67 | 6.25 | 6.50 | 6.20 | (7) | 6.50 |
| 1876 | (7.60) | 7.40 | (7.75) | 7.50 | (7.75) | 7.62 | (8) | 7.60 |
| 1877 | 6.50 | 6.25 | 6.62 | 6.50 | 6.50 | 6.37 | 6.37 | 6.25 |
| 1878 | 5.75 | 5.50 | 5.62 | 5.25 | 5.62 | 5.25 | 5.25 | 5 |
| 1879 | 4.50 | 4.25 | 4.62 | 4.40 | 4.62 | 4.37 | 4.75 | 4.25 |
| 1880 | 6.50 | 5.87 | 6.75 | 6.37 | 6.75 | 6.50 | 6.50 | 6.12 |
| 1881 | 5.25 | 4.87 | 5.25 | 5.12 | 5 | 4.87 | 5.12 | 4.75 |
| 1882 | 6 | 5.75 | 5.75 | 5.62 | 5.62 | 5.37 | 5.50 | 5.25 |
| 1883 | 4.62 | 4.50 | 4.62 | 4.50 | 4.75 | 4.62 | 4.75 | 4.60 |
| 1884 | 4.37 | 4.20 | 4.40 | 4.25 | 4.60 | 4.40 | 4.65 | 4.50 |
| 1885 | 4.50 | 4.12 | 4.30 | 4.25 | 4.30 | 4.12 | 4.30 | 4.12 |
| 1886 | 4.50 | 4.30 | 4.55 | 4.30 | 4.60 | 4.50 | 4.60 | 4.50 |
| 1887 | 4.60 | 4.50 | 4.60 | 4.40 | 4.60 | 4.40 | 4.65 | 4.45 |
| 1888 | 5.37 | 5.20 | 5.35 | 5.25 | 5.25 | 4.87 | 4.87 | 4.60 |
| 1889 | 5 | 5 | 5 | 4.90 | 4.87 | 4.70 | 4.65 | 4.65 |
| 1890 | 5.45 | 5.35 | 5.35 | 4.20 | 5.20 | 5 | 5 | 4.90 |
| 1891 | 6 | 5.25 | 5.25 | 5 | 5.10 | 5 | 5.10 | 4.90 |
| 1892 | 4.70 | 4.60 | 4.60 | 4.55 | 4.60 | 4.50 | 4.80 | 4.60 |
| 1893 | 4.35 | 4.30 | 4.30 | 4.25 | 4.25 | 4.20 | 4.50 | 4.30 |
| 1894 | 3.60 | 3.50 | 4 | 3.60 | 3.85 | 3.80 | 3.75 | 3.50 |
| 1895 | 3.35 | 3.20 | 3.20 | 3.10 | 3.20 | 3.15 | 3.30 | 3.25 |
| 1896 | 4.05 | 4 | 4.15 | 4 | 4.15 | 4.10 | 4.20 | 4.05 |
| 1897 | 4.10 | 3.90 | 4.10 | 4 | 4.15 | 4.10 | 4.15 | 4.10 |

*Price of common Western spelter in New York City, 1875 to 1897*—Continued.

[Cents per pound; figures in parentheses are combination prices.]

| Year. | May. | | June. | | July. | | August. | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1875 | (7.25) | 7.15 | (7.25) | 7.15 | (7.35) | 7.25 | (7.25) | 7.10 |
| 1876 | (8) | 7.75 | (8) | 7.25 | 7.25 | 7.12 | 7.25 | 7 |
| 1877 | 6.25 | 6 | 6.12 | 5.87 | 5.87 | 5.62 | 5.90 | 5.80 |
| 1878 | 5 | 4.62 | 4.62 | 4.25 | 4.75 | 4.50 | 4.87 | 4.50 |
| 1879 | 4.50 | 4.25 | 4.37 | 4.12 | 4.75 | 4.37 | 5.62 | 4.80 |
| 1880 | 6 | 4.62 | 5.50 | 5.12 | 5 | 4.87 | 5.25 | 4.87 |
| 1881 | 5 | 4.87 | 5 | 4.75 | 5 | 4.75 | 5.12 | 5 |
| 1882 | 5.62 | 5.25 | 5.37 | 5.25 | 5.37 | 5.12 | 5.50 | 5.12 |
| 1883 | 4.75 | 4.50 | 4.62 | 4.37 | 4.50 | 4.30 | 4.40 | 4.30 |
| 1884 | 4.60 | 4.45 | 4.60 | 4.45 | 4.55 | 4.45 | 4.62 | 4.52 |
| 1885 | 4.25 | 4.10 | 4.10 | 4 | 4.40 | 4.10 | 4.60 | 4.40 |
| 1886 | 4.60 | 4.40 | 4.40 | 4.35 | 4.40 | 4.30 | 4.40 | 4.30 |
| 1887 | 4.65 | 4.45 | 4.65 | 4.50 | 4.50 | 4.50 | 4.60 | 4.55 |
| 1888 | 4.65 | 4.60 | 4.60 | 4.50 | 4.55 | 4.50 | 4.87 | 4.50 |
| 1889 | 4.85 | 4.62 | 5 | 5 | 5.10 | 5 | 5.20 | 5.15 |
| 1890 | 5.45 | 5 | 5.60 | 5.35 | 5.60 | 5.40 | 5.55 | 5.40 |
| 1891 | 4.90 | 4.85 | 5.10 | 4.90 | 5.10 | 5.05 | 5.10 | 5 |
| 1892 | 4.90 | 4.80 | 4.90 | 4.80 | 4.85 | 4.70 | 4.70 | 4.65 |
| 1893 | 4.40 | 4.20 | 4.25 | 4.15 | 4.15 | 3.90 | 3.90 | 3.55 |
| 1894 | 3.55 | 3.45 | 3.50 | 3.40 | 3.50 | 3.45 | 3.45 | 3.40 |
| 1895 | 3.65 | 3.30 | 3.75 | 3.30 | 3.85 | 3.70 | 4.20 | 4 |
| 1896 | 4.15 | 4.00 | 4.15 | 4.00 | 4.10 | 3.90 | 3.90 | 3.65 |
| 1897 | 4.20 | 4.10 | 4.25 | 4.15 | 4.30 | 4.20 | 4.35 | 4.25 |

| Year. | September. | | October. | | November. | | December. | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1875 | (7.25) | 7.10 | (7.40) | 7.15 | (7.40) | 7.15 | (7.40) | 7.15 |
| 1876 | 7.12 | 6.80 | 6.75 | 6.62 | 6.62 | 6.37 | 6.50 | 6.37 |
| 1877 | 5.87 | 5.75 | 5.90 | 5.70 | 5.87 | 5.62 | 5.75 | 5.50 |
| 1878 | 4.87 | 4.75 | 4.82 | 4.50 | 4.75 | 4.50 | 4.37 | 4.25 |
| 1879 | 6 | 5.62 | 6.37 | 6 | 6.25 | 5.87 | 6.25 | 6 |
| 1880 | 5.12 | 4.75 | 5 | 4.87 | 4.90 | 4.65 | 4.75 | 4.65 |
| 1881 | 5.25 | 5 | 5.37 | 5.25 | 5.87 | 5.50 | 6 | 5.87 |
| 1882 | 5.37 | 5.12 | 5.37 | 5.12 | 5.12 | 4.87 | 4.87 | 4.50 |
| 1883 | 4.50 | 4.40 | 4.45 | 4.35 | 4.40 | 4.37 | 4.37 | 4.35 |
| 1884 | 4.62 | 4.50 | 4.55 | 4.40 | 4.40 | 4.30 | 4.25 | 4 |
| 1885 | 4.62 | 4.50 | 4.62 | 4.50 | 4.60 | 4.45 | 4.60 | 4.45 |
| 1886 | 4.40 | 4.25 | 4.30 | 4.25 | 4.30 | 4.25 | 4.50 | 4.35 |
| 1887 | 4.65 | 4.60 | 4.65 | 4.50 | 4.80 | 4.52 | 5.87 | 5 |

*Prices of common Western spelter in New York City, 1875 to 1897*—Continued.

[Cents per pound.]

| Year. | September. | | October. | | November. | | December. | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1888 | 5.12 | 4.75 | 5.12 | 4.87 | 5.12 | 4.87 | 5.12 | 4.87 |
| 1889 | 5.15 | 5.10 | 5.15 | 5.10 | 5.25 | 5.05 | 5.35 | 5.30 |
| 1890 | 5.65 | 5.50 | 6 | 5.65 | 6.10 | 5.90 | 6 | 5.90 |
| 1891 | 5 | 4.85 | 5.15 | 4.95 | 4.90 | 4.75 | 4.75 | 4.65 |
| 1892 | 4.65 | 4.50 | 4.50 | 4.35 | 4.40 | 4.35 | 4.40 | 4.35 |
| 1893 | 3.75 | 3.65 | 3.70 | 3.55 | 3.85 | 3.60 | 3.80 | 3.70 |
| 1894 | 3.50 | 3.40 | 3.50 | 3.37 | 3.40 | 3.35 | 3.35 | 3.25 |
| 1895 | 4.35 | 4.15 | 4.20 | 3.90 | 3.80 | 3.45 | 3.50 | 3.40 |
| 1896 | 3.70 | 3.60 | 3.75 | 3.65 | 4.25 | 3.75 | 4.25 | 4.15 |
| 1897 | 4.35 | 4.25 | 4.30 | 4.15 | 4.25 | 3.90 | 3.90 | 3.75 |

## FOREIGN SPELTER PRODUCTION.

Messrs. Henry R. Merton & Co., of London, make the following report on the spelter production of Europe:

*Estimate of the production of zinc in Europe.*

[Long tons.]

| Country. | 1897. | 1896. | 1895. | 1894. | 1893. | 1892. | 1891. |
|---|---|---|---|---|---|---|---|
| Rhine district and Belgium | 184,455 | 179,730 | 172,135 | 152,420 | 149,750 | 143,305 | 139,695 |
| Silesia | 94,045 | 95,875 | 93,620 | 91,145 | 90,310 | 87,760 | 87,080 |
| Great Britain | 23,430 | 25,880 | 29,495 | 32,065 | 28,375 | 30,310 | 29,410 |
| France and Spain | 32,120 | 28,450 | 22,895 | 21,245 | 20,585 | 18,662 | 18,360 |
| Austria | 8,185 | 9,255 | 8,355 | 8,580 | 7,560 | 5,020 | 6,440 |
| Poland | 5,760 | 6,165 | 4,960 | 5,015 | 4,530 | 4,270 | 3,760 |
| Total | 347,995 | 345,355 | 331,460 | 310,470 | 301,110 | 289,327 | 284,745 |

| Country. | 1890. | 1889. | 1888. | 1887. | 1886. | 1885. | 1884. |
|---|---|---|---|---|---|---|---|
| Rhine district and Belgium | 137,630 | 134,648 | 133,245 | 130,995 | 129,020 | 129,754 | 129,210 |
| Silesia | 87,475 | 85,653 | 83,375 | 81,375 | 81,630 | 79,623 | 76,116 |
| Great Britain | 29,145 | 30,806 | 26,783 | 19,839 | 21,230 | 24,299 | 29,259 |
| France and Spain | 18,240 | 16,785 | 16,140 | 16,028 | 15,305 | 14,847 | 15,341 |
| Austria | 7,135 | 6,330 | 4,977 | 5,338 | 5,000 | 5,610 | 6,170 |
| Poland | 3,620 | 3,026 | 3,785 | 3,580 | 4,145 | 5,019 | 4,164 |
| Total | 283,245 | 277,248 | 268,305 | 257,155 | 256,330 | 259,152 | 260,290 |

The output of the works in the different districts was as follows:

*Production of zinc by principal foreign producers from 1893 to 1897.*

[Long tons.]

| Country. | 1897. | 1896. | 1895. | 1894. | 1893. |
|---|---|---|---|---|---|
| Rhine district and Belgium: | | | | | |
| Vieille Montagne | 67,600 | 67,500 | 63,545 | 54,030 | 54,305 |
| Stolberg Co | 17,650 | 16,715 | 16,385 | 15,170 | 15,135 |
| Austro-Belge | 9,630 | 9,810 | 9,855 | 9,595 | 9,855 |
| G. Dumont & Frères | 11,360 | 10,040 | 10,080 | 9,415 | 8,680 |
| Rhein-Nassau Co | 9,495 | 8,870 | 9,085 | 8,165 | 8,205 |
| L. de Laminne | 7,260 | 7,050 | 6,440 | 6,930 | 6,920 |
| Escombrera Bleyberg | 5,075 | 5,575 | 5,690 | 5,750 | 5,775 |
| Grillo | 6,155 | 6,320 | 6,195 | 5,615 | 5,625 |
| Mürk, Westf., Bergw., Verein | 5,825 | 6,220 | 6,155 | 5,620 | 5,620 |
| Nouvelle Montagne | 8,255 | 7,695 | 6,815 | 5,290 | 5,290 |
| Berzelius | 5,055 | 5,010 | 5,535 | 5,350 | 5,345 |
| Eschger Ghesquiere & Co | 3,450 | 3,810 | 4,205 | 4,375 | 4,370 |
| Société Prayon | 8,840 | a8,000 | 7,330 | 4,110 | 4,250 |
| Société de Boom | 7,855 | 8,380 | 7,155 | 7,065 | 7,110 |
| Zinkmaatshappy in Limburg | ..... | ..... | ..... | a700 | a2,000 |
| Société Campine | 6,600 | 4,770 | 4,200 | a2,810 | a700 |
| Schulte & Co | 4,350 | 3,965 | 3,465 | 2,430 | 565 |
| Total | 184,455 | 179,730 | 172,135 | 152,420 | 149,750 |
| Silesia: | | | | | |
| Schlesische Actien-Gesellschaft | 26,270 | 26,430 | 25,950 | 25,230 | 25,255 |
| G. von Giesche's Erben | 20,185 | 20,355 | 19,860 | 19,385 | 18,920 |
| Herzog von Ujest | 24,460 | 25,995 | 21,140 | 17,265 | 17,210 |
| Graf H. Henckel von Donnersmarck | 12,185 | 11,980 | 11,680 | 12,005 | 11,695 |
| Graefin Schaffgotsch | ..... | ..... | 3,570 | 6,940 | 6,885 |
| Graf G. Henckel von Donnersmarck | 4,025 | 4,320 | 4,400 | 4,185 | 4,215 |
| H. Roth | 3,550 | 3,250 | 3,320 | 1,805 | 1,775 |
| Wünsch | 1,925 | 2,065 | 2,155 | 1,980 | 2,075 |
| Vereinigte Königs & Laurahütte | 1,260 | 1,340 | 1,400 | 1,270 | 1,170 |
| Baron v. Horschitz'sche Erben | ..... | ..... | ..... | 935 | 960 |
| Fiscus | 185 | 140 | 145 | 145 | 150 |
| Total | 94,025 | 95,875 | 93,620 | 91,145 | 90,310 |

a Estimated.

*Production of zinc by principal foreign producers*—Continued.

[Long tons.]

| Country. | 1897. | 1896. | 1895. | 1894. | 1893. |
|---|---|---|---|---|---|
| Great Britain: | | | | | |
| Vivian & Sons | 5,050 | 5,120 | 6,970 | 8,005 | 7,060 |
| English Crown Spelter Co., Limited | 5,435 | 5,360 | 5,700 | 5,515 | 5,380 |
| Dillwyn & Co | 4,040 | 4,265 | 4,935 | 4,870 | 3,450 |
| Swansea Vale Spelter Co | 1,305 | 1,665 | 2,375 | 2,380 | 2,105 |
| Villiers Spelter Co | a1,180 | 1,670 | 2,155 | 2,300 | 2,050 |
| Pascoe, Grenfell & Sons | 1,190 | 1,320 | 1,680 | 1,455 | 1,260 |
| Nenthead & Tynedale Co | ..... | 640 | 1,775 | 1,870 | 1,855 |
| John Lysaght, Limited | 3,540 | 2,790 | 1,805 | 2,915 | 2,760 |
| H. Kenyon & Co | 490 | 550 | 500 | 505 | 500 |
| Leeswood Co | 1,200 | 1,500 | 1,600 | 1,750 | 1,495 |
| Sundries | ..... | ..... | ..... | 500 | 460 |
| Total | 23,430 | 24,880 | 29,495 | 32,065 | 28,375 |
| France and Spain: | | | | | |
| Asturienne | 23,385 | 20,710 | 17,915 | 18,695 | 18,695 |
| St. Amand | 2,580 | 2,585 | 2,520 | 2,550 | 1,890 |
| Malfidano | 4,780 | 5,155 | 2,460 | ..... | ..... |
| Côte d'Or | 1,375 | ..... | ..... | ..... | ..... |
| Total | 32,120 | 28,450 | 22,895 | 21,245 | 20,585 |
| Austria: | | | | | |
| Sagór | 955 | 1,310 | 1,080 | 1,225 | 1,360 |
| Cilli | 2,505 | 2,310 | 1,990 | 2,580 | 2,510 |
| Siersza-Niedzieliska | 4,525 | 4,650 | 4,300 | 4,420 | 3,690 |
| Merklin | ..... | 985 | 985 | 355 | ..... |
| Trzevinia | 200 | ..... | ..... | ..... | ..... |
| Total | 8,185 | 9,255 | 8,355 | 8,580 | 7,560 |
| Poland | 5,760 | 6,155 | 4,960 | 5,015 | 4,530 |

a Estimated.

The Metallgesellschaft, of Frankfort-on-the-Main, has compiled the following valuable table, showing the consumption of spelter in the leading countries:

*Consumption of zinc, 1891 to 1897, inclusive.*

| Country. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|
| | *Metric tons.* | *Metric tons.* | *Metric tons.* | *Metric tons.* | *Metric tons.* | *Metric tons.* | *Metric tons.* |
| Germany | 89,469 | 99,672 | 93,575 | 99,766 | 110,895 | 111,360 | 119,110 |
| England | 80,755 | 73,547 | 75,042 | 75,504 | 83,828 | 94,682 | 86,463 |
| France | 41,418 | 40,783 | 44,721 | 45,421 | 39,667 | 51,483 | 54,433 |
| Austria-Hungary | 17,240 | 18,519 | 22,046 | 23,582 | 25,140 | 25,686 | 24,143 |
| Italy | 1,628 | 1,575 | 1,682 | 2,230 | 2,374 | 2,563 | 2,969 |
| Belgium | 39,600 | 42,600 | 42,300 | 48,100 | 47,900 | 48,000 | 49,500 |
| Netherlands | *a* 3,600 | *a* 3,600 | *a* 3,600 | *a* 3,600 | *a* 3,600 | *a* 3,600 | *a* 3,600 |
| Spain | 3,611 | 3,613 | 3,500 | 3,320 | 4,633 | 2,439 | 2,329 |
| Russia | 8,521 | 9,438 | 9,600 | 10,800 | 11,670 | 11,463 | 13,653 |
| United States | 71,327 | 73,465 | 69,058 | 64,028 | 78,424 | 66,054 | 77,680 |
| Other countries | *a* 8,000 | *a* 9,500 | *a*13,000 | *a* 8,000 | *a* 7,000 | *a* 7,000 | *a* 7,600 |
| Total consumption | 365,169 | 376,312 | 378,124 | 384,351 | 415,131 | 424,330 | 441,480 |
| Total production | 362,204 | 372,900 | 378,093 | 380,877 | 416,621 | 425,154 | 443,181 |

*a* Estimated.

The following statistics relative to the zinc industry of Silesia are compiled from the reports of the Oberschlesische Berg- und Hüttenmännische Verein:

*Production of zinc mines of Silesia, 1888 to 1897.*

| Year. | Calamine. | Blende. | Total. |
|---|---|---|---|
| | *Metric tons.* | *Metric tons.* | *Metr ic tons.* |
| 1888 | 319,316 | 212,264 | 531,580 |
| 1889 | 325,705 | 246,955 | 572,660 |
| 1890 | 368,495 | 261,921 | 630,416 |
| 1891 | 391,891 | 271,277 | 663,168 |
| 1892 | 358,230 | 291,617 | 649,847 |
| 1893 | 348,654 | 287,375 | 636,029 |
| 1894 | ..... | ..... | 574,335 |
| 1895 | 273,151 | 267,673 | 540,824 |
| 1896 | 263,338 | 275,514 | 538,852 |
| 1897 | 240,266 | 270,420 | 510,686 |

Nearly one-fifth of the 10,292 persons employed in the zinc and lead mines of Silesia are women. The total wages paid were 5,988,965 marks, the annual average for men being 689.06 marks, for boys 197.70 marks, and for women 241.96 marks. The production of calamine in Silesia is declining, while the mining of blende is restricted because the preparation of this ore for the furnaces is meeting with obstacles. Permission for the building of roasting plants is only granted when the gases are used in the manufacture of sulphuric acid. Rates of freight on the acid are so high that markets at a distance greater than about 100 miles can not be reached. Complaint is also made of an inadequate and irregular supply of tank cars for shipment.

During 1897 the 23 zinc works of Silesia employed 7,738 persons, to whom wages aggregating 5,457,876 marks were paid, the average earnings of men being 833.87 marks, of women 326.32 marks, and of boys 266.90 marks.

The consumption of material was 258,758 metric tons of calamine, 227,779 of blende, 438 tons of furnace accretions, 7,412 tons of zinc dust and scrap, 1,074,805 tons of coal, and 26,413 tons of fire clay.

The production was 95,547 metric tons of spelter, 15,527 tons of cadmium, and 1,174 tons of lead. The average value of the spelter was 386.40 marks per ton. The deliveries during the year amounted to 94,599 metric tons, as compared with 101,140 tons in 1896.

Five rolling mills employed 763 persons, to whom 524,714 marks were paid, the average yearly earnings for men declining from 825.93 marks in 1896 to 764.69 marks in 1897. These rolling mills consumed 37,860 tons of spelter to make 36,618 tons of sheet zinc, the value of which aggregated 12,866,725 marks, or 351.38 marks per ton.

The Vieille Montagne Company, the largest producer in the world, had a very prosperous year. The production of crude zinc was 68,604 metric tons in 1897, as compared with 68,581 tons in 1896, 64,497 tons in 1895, and 54,839 tons in 1894. The product of sheet zinc was 68,024 tons, contrasted with 66,893 tons in 1896, 57,000 tons in 1895, and 54,515 tons in 1894. The production of zinc white was 8,357 tons in 1897, as against 8,777 tons in 1896, 8,988 tons in 1895, and 7,669 tons in 1894.

The average price of spelter rose further in 1897, having advanced from 353.26 francs per metric ton in 1895 to 402.75 francs in 1896, and 424.85 francs in 1897. M. Saint Paul de Sinçay, the managing director, reports, however, that costs have risen, and that they will continue to advance in 1898, owing to higher prices for ore, higher fuel, labor, and materials, and the necessity for organizing the mines for a larger output and for spending money for prospecting. The company has built a large modern concentrating plant at the Bensberg mines, is developing the recently acquired Nenthead property, and is extending its roasting plant, because the proportion of blendes treated is increasing, the quantities of calamine being on the decline.

In 1897 the gross profit was 6,647,641.48 francs, as compared with 6,328,725.89 francs in 1896. From the profit in 1897 there must be deducted for general costs of administration, interest, discounts, etc., 628,323.96 francs. The gross profit was distributed as follows: 1,231,317.52 francs written off from value of works and mines; 867,600 francs to reserve; 433,800 francs to the administration; 108,450 francs to the direction, and 3,375,000 francs to the stockholders as an outstanding share capital of 9,000,000 francs. In 1896 the dividends aggregated 2,925,000 francs and in 1895 2,250,000 francs.

From 1837 to 1897 the company reduced its capital by 2,250,000 francs and paid off two issues of bonds aggregating 14,800,000 francs. On its mining property and works it has written off during the sixty years 53,105,604.55 francs and has accumulated the following funds: Insurance, 1,240,708.31 francs; special reserve, 1,585,000 francs; special profit fund, 1,000,000 francs; and statutory reserve fund, 6,628,366.53 francs. It also has a workmen's savings bank with 2,871,017.33 francs, a fund for helping workmen of 15,803.87 francs, a life assurance and endowment fund of 838,979.35 francs, and a special fund with Vieille Montagne of 1,183,135.59 francs.

# ALUMINUM.

## PRODUCTION.

The increase in the production of aluminum from the sources noted in previous reports was even more significant than in 1896, the product for 1897 being 4,000,000 pounds, or three times the product of 1896. Its value is estimated at $1,500,000, or 37½ cents per pound. This price represents, of course, the metal in the first stage of its manufacture, the price for sheets, wire, and other manufactures bearing the usual approximate additional cost.

*Production of aluminum in the United States from 1883 to 1897.*

| Year. | Pounds. | Year. | Pounds. |
|---|---|---|---|
| 1883 | 83 | 1892 | 259,885 |
| 1884 | 150 | 1893 | 333,629 |
| 1885 | 283 | 1894 | 550,000 |
| 1886 | 3,000 | 1895 | 920,000 |
| 1887 | 18,000 | 1896 | 1,300,000 |
| 1888 | 19,000 | 1897 | 4,000,000 |
| 1889 | 47,468 | Total | 7,662,779 |
| 1890 | 61,281 | | |
| 1891 | 150,000 | | |

## IMPORTS.

*Aluminum imported and entered for consumption in the United States from 1870 to 1890.*

| Year ending— | Quantity. | Value. | Year ending— | Quantity. | Value. |
|---|---|---|---|---|---|
| June 30— | *Pounds.* | | June 30— | *Pounds.* | |
| 1870 | ..... | $98 | 1882 | 566.50 | $6,450 |
| 1871 | ..... | 341 | 1883 | 426.25 | 5,079 |
| 1873 | 2 | 2 | 1884 | 595 | 8,416 |
| 1874 | 683 | 2,125 | 1885 | 439 | 4,736 |
| 1875 | 434 | 1,355 | Dec. 31— | | |
| 1876 | 139 | 1,412 | 1886 | 452.10 | 5,369 |
| 1877 | 131 | 1,551 | 1887 | 1,260 | 12,119 |
| 1878 | 251 | 2,978 | 1888 | 1,348.53 | 14,086 |
| 1879 | 284.44 | 3,423 | 1889 | 998 | 4,840 |
| 1880 | 340.75 | 4,042 | 1890 | 2,051 | 7,062 |
| 1881 | 517.10 | 6,071 | | | |

*Imports of crude and manufactured aluminum from 1891 to 1897.*

| Calendar year. | Crude. | | Leaf. | | Plates, sheets, bars, and rods. | | Manufactures. | Total value. |
|---|---|---|---|---|---|---|---|---|
| | Pounds. | Value. | Packs of 100. | Value. | Pounds. | Value. | | |
| 1891 | 3,922 | $6,266 | 10,033 | $1,135 | ..... | ..... | $1,161 | $8,562 |
| 1892 | 43 | 51 | 14,540 | 1,202 | ..... | ..... | 1,036 | 2,289 |
| 1893 | 7,816 | 4,683 | 18,700 | 1,903 | ..... | ..... | 1,679 | 8,265 |
| 1894 | 5,306 | 2,514 | 10,780 | 1,210 | ..... | ..... | 386 | 4,110 |
| 1895 | 25,294 | 7,814 | 6,610 | 646 | ..... | ..... | 1,841 | 10,301 |
| 1896 | 698 | 591 | 4,657 | 523 | ..... | ..... | 2,365 | 3,479 |
| 1897 | 1,822 | 1,082 | 4,260 | 368 | 4,424 | $3,058 | 221 | 4,729 |

## BAUXITE.

### PRODUCTION.

The production of bauxite, as given below, showed the customary slight increase from the usual source:

*Production of bauxite in the United States from 1889 to 1897, by States.*

| Calendar year. | Georgia. | Alabama. | Total. |
|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* |
| 1889 | 728 | ..... | 728 |
| 1890 | 1,844 | ..... | 1,844 |
| 1891 | 3,301 | 292 | 3,593 |
| 1892 | 5,110 | 5,408 | 10,518 |
| 1893 | 2,415 | 6,764 | 9,179 |
| 1894 | 2,050 | 9,016 | 11,066 |
| 1895 | 3,756 | 13,313 | 17,069 |
| 1896 | 7,313 | 11,051 | 18,364 |
| 1897 | ..... | ..... | 20,590 |

# QUICKSILVER.

## PRODUCTION.

The production in 1897 amounted to 26,691 flasks, valued at $993,445. The decline in 1896 continued in 1897, and up to the present time there are no signs of new sources to draw upon during the current year. The supply in 1897 came entirely from the well-known sources in Calusa, Lake, Napa, San Benito, Santa Clara, San Luis Obispo, Sonoma, and Trinity counties, California.

The following table shows the range of prices per month during 1897:

## PRICES.

*Highest and lowest prices of quicksilver in 1897.*

[Per flask.]

| Month. | Price in San Francisco. | | Price in London. | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | | | Lowest. | | |
| | | | £. | s. | d. | £. | s. | d. |
| January | $37.50 | $36.50 | 5 | 17 | 6 | 6 | 12 | 6 |
| February | 38.00 | 37.50 | 7 | 0 | 0 | 6 | 17 | 6 |
| March | 40.00 | 38.75 | 7 | 5 | 0 | 6 | 17 | 6 |
| April | 40.00 | 40.00 | 7 | 5 | 0 | 7 | 0 | 0 |
| May | 40.50 | 40.00 | 7 | 7 | 6 | 7 | 5 | 0 |
| June | 40.50 | 40.50 | 7 | 7 | 6 | 7 | 5 | 0 |
| July | 40.00 | 40.00 | 7 | 5 | 0 | 7 | 5 | 0 |
| August | 40.00 | 38.00 | 7 | 5 | 0 | 6 | 17 | 6 |
| September | 38.00 | 38.00 | 6 | 17 | 6 | 6 | 15 | 0 |
| October | 39.00 | 38.00 | 7 | 0 | 0 | 6 | 17 | 6 |
| November | 39.00 | 39.00 | 7 | 0 | 0 | 7 | 0 | 0 |
| December | 39.00 | 39.00 | 7 | 0 | 0 | 7 | 0 | 0 |
| Extreme range | 40.50 | 36.50 | 7 | 7 | 6 | 6 | 12 | 6 |

*Highest and lowest prices of quicksilver during the last forty-eight years.*

[Per flask.]

| Year. | Price in San Francisco. | | Price in London. | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | | | Lowest. | | |
| | | | £. | s. | d. | £. | s. | d. |
| 1850 | $114.75 | $84.15 | 15 | 0 | 0 | 13 | 2 | 6 |
| 1851 | 76.50 | 57.35 | 13 | 15 | 0 | 12 | 5 | 0 |
| 1852 | 61.20 | 55.45 | 11 | 10 | 0 | 9 | 7 | 6 |
| 1853 | 55.45 | 55.45 | 8 | 15 | 0 | 8 | 2 | 6 |
| 1854 | 55.45 | 55.45 | 7 | 15 | 0 | 7 | 5 | 0 |
| 1855 | 55.45 | 51.65 | 6 | 17 | 6 | 6 | 10 | 0 |
| 1856 | 51.65 | 51.65 | 6 | 10 | 0 | 6 | 10 | 0 |
| 1857 | 53.55 | 45.90 | 6 | 10 | 0 | 6 | 10 | 0 |
| 1858 | 49.75 | 45.90 | 7 | 10 | 0 | 7 | 5 | 0 |
| 1859 | 76.50 | 49.75 | 7 | 5 | 0 | 7 | 0 | 0 |
| 1860 | 57.35 | 49.75 | 7 | 0 | 0 | 7 | 0 | 0 |
| 1861 | 49.75 | 34.45 | 7 | 0 | 0 | 7 | 0 | 0 |
| 1862 | 38.25 | 34.45 | 7 | 0 | 0 | 7 | 0 | 0 |
| 1863 | 45.90 | 38.25 | 7 | 0 | 0 | 7 | 0 | 0 |
| 1864 | 45.90 | 45.90 | 9 | 0 | 0 | 7 | 10 | 0 |
| 1865 | 45.90 | 45.90 | 8 | 0 | 0 | 7 | 17 | 6 |
| 1866 | 57.35 | 45.90 | 8 | 0 | 0 | 6 | 17 | 0 |
| 1867 | 45.90 | 45.90 | 7 | 0 | 0 | 6 | 16 | 0 |
| 1868 | 45.90 | 45.90 | 6 | 17 | 0 | 6 | 16 | 0 |
| 1869 | 45.90 | 45.90 | 6 | 17 | 0 | 6 | 16 | 0 |
| 1870 | 68.85 | 45.90 | 10 | 0 | 0 | 6 | 16 | 0 |
| 1871 | 68.85 | 57.35 | 12 | 0 | 0 | 9 | 0 | 0 |
| 1872 | 66.95 | 65.00 | 13 | 0 | 0 | 10 | 0 | 0 |
| 1873 | 91.80 | 68.85 | 20 | 0 | 0 | 12 | 10 | 0 |
| 1874 | 118.55 | 91.80 | 26 | 0 | 0 | 19 | 0 | 0 |
| 1875 | 118.55 | 49.75 | 24 | 0 | 0 | 9 | 17 | 6 |
| 1876 | 53.55 | 34.45 | 12 | 0 | 0 | 7 | 17 | 6 |
| 1877 | 44.00 | 30.60 | 9 | 10 | 0 | 7 | 2 | 6 |
| 1878 | 35.95 | 29.85 | 7 | 5 | 0 | 6 | 7 | 6 |
| 1879 | 34.45 | 25.25 | 8 | 15 | 0 | 5 | 17 | 6 |
| 1880 | 34.45 | 27.55 | 7 | 15 | 0 | 6 | 7 | 6 |
| 1881 | 31.75 | 27.90 | 7 | 0 | 0 | 6 | 2 | 6 |
| 1882 | 29.10 | 27.35 | 6 | 5 | 0 | 5 | 15 | 0 |
| 1883 | 28.50 | 26.00 | 5 | 17 | 6 | 5 | 5 | 0 |
| 1884 | 35.00 | 26.00 | 6 | 15 | 0 | 5 | 2 | 6 |
| 1885 | 33.00 | 28.50 | 6 | 15 | 0 | 5 | 10 | 0 |
| 1886 | 39.00 | 32.00 | 7 | 10 | 0 | 5 | 16 | 3 |
| 1887 | 50.00 | 36.50 | 11 | 5 | 0 | 6 | 7 | 6 |
| 1888 | 47.00 | 36.00 | 10 | 0 | 0 | 6 | 12 | 6 |

*Highest and lowest prices of quicksilver during the last forty-eight years*—Continued.

[Per flask.]

| Year. | Price in San Francisco. | | Price in London. | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Highest. | Lowest. | Highest. | | | Lowest. | | |
| | | | £ | s. | d. | £ | s. | d. |
| 1889 | $50.00 | $40.00 | 9 | 15 | 0 | 7 | 10 | 0 |
| 1890 | 58.00 | 47.00 | 10 | 10 | 0 | 9 | 1 | 0 |
| 1891 | 51.00 | 39.50 | 8 | 12 | 6 | 7 | 5 | 0 |
| 1892 | 47.50 | 41.50 | 7 | 10 | 0 | 6 | 2 | 6 |
| 1893 | 43.50 | 30.00 | 6 | 17 | 6 | 6 | 2 | 0 |
| 1894 | 37.00 | 28.50 | 6 | 15 | 0 | 5 | 7 | 6 |
| 1895 | 41.00 | 35.90 | 7 | 10 | 0 | 6 | 10 | 0 |
| 1896 | 40.00 | 36.00 | 7 | 7 | 6 | 6 | 7 | 6 |
| 1897 | 40.50 | 36.50 | 7 | 7 | 6 | 6 | 12 | 6 |
| Extreme range | 118.55 | 25.25 | 26 | 0 | 0 | 5 | 2 | 6 |

The following table continues the statistics of production since the quicksilver industry began in the United States, showing the grand total of 1,770,476 flasks as the entire product. In the column headed "Various mines" are included in 1897 Central, Chicago, Corona, Manhattan, and Sunderland mines. The Mount Jackson mine was worked under the management of the Great Eastern, and its product is found in that column.

*Total product of quicksilver in the United States.*

[Flasks of 76½ pounds, net.]

| Year. | New Almaden. | New Idria. | Redington. | Sulphur Bank. | Great Western. | Napa Consolidated. |
|---|---|---|---|---|---|---|
| 1850 | 7,723 | ..... | ..... | ..... | ..... | ..... |
| 1851 | 27,779 | ..... | ..... | ..... | ..... | ..... |
| 1852 | 15,901 | ..... | ..... | ..... | ..... | ..... |
| 1853 | 22,284 | ..... | ..... | ..... | ..... | ..... |
| 1854 | 30,004 | ..... | ..... | ..... | ..... | ..... |
| 1855 | 29,142 | ..... | ..... | ..... | ..... | ..... |
| 1856 | 27,138 | ..... | ..... | ..... | ..... | ..... |
| 1857 | 28,204 | ..... | ..... | ..... | ..... | ..... |
| 1858 | 25,761 | ..... | ..... | ..... | ..... | ..... |
| 1859 | 1,294 | ..... | ..... | ..... | ..... | ..... |
| 1860 | 7,061 | ..... | ..... | ..... | ..... | ..... |
| 1861 | 34,429 | ..... | ..... | ..... | ..... | ..... |
| 1862 | 39,671 | ..... | 444 | ..... | ..... | ..... |
| 1863 | 32,803 | ..... | 852 | ..... | ..... | ..... |
| 1864 | 42,489 | ..... | 1,914 | ..... | ..... | ..... |
| 1865 | 47,194 | (a) | 3,545 | ..... | ..... | ..... |
| 1866 | 35,150 | 6,525 | 2,254 | ..... | ..... | ..... |
| 1867 | 24,461 | 11,493 | 7,862 | ..... | ..... | ..... |
| 1868 | 25,628 | 12,180 | 8,686 | ..... | ..... | ..... |
| 1869 | 16,898 | 10,315 | 5,018 | ..... | ..... | ..... |
| 1870 | 14,423 | 9,888 | 4,546 | ..... | ..... | ..... |
| 1871 | 18,568 | 8,180 | 2,128 | ..... | ..... | ..... |
| 1872 | 18,574 | 8,171 | 3,046 | ..... | ..... | ..... |
| 1873 | 11,042 | 7,735 | 3,294 | ..... | 340 | ..... |
| 1874 | 9,084 | 6,911 | 6,678 | 573 | 1,122 | ..... |
| 1875 | 13,648 | 8,432 | 7,513 | 5,372 | 3,384 | ..... |
| 1876 | 20,549 | 7,272 | 9,183 | 8,367 | 4,322 | 573 |
| 1877 | 23,996 | 6,316 | 9,399 | 10,993 | 5,856 | 2,229 |
| 1878 | 15,852 | 5,138 | 6,686 | 9,465 | 4,963 | 3,049 |
| 1879 | 20,514 | 4,425 | 4,516 | 9,249 | 6,333 | 3,605 |
| 1880 | 23,465 | 3,209 | 2,139 | 10,706 | 6,442 | 4,416 |
| 1881 | 26,060 | 2,775 | 2,194 | 11,152 | 6,241 | 5,552 |
| 1882 | 28,070 | 1,953 | 2,171 | 5,014 | 5,179 | 6,842 |
| 1883 | 29,000 | 1,606 | 1,894 | 2,612 | 3,869 | 5,890 |
| 1884 | 20,000 | 1,025 | 881 | 890 | 3,292 | 4,307 |
| 1885 | 21,400 | 1,144 | 385 | 1,296 | 3,469 | 3,506 |
| 1886 | 18,000 | 1,406 | 409 | 1,449 | 1,949 | 5,247 |
| 1887 | 20,000 | 1,890 | 673 | 1,490 | 1,446 | 5,574 |
| 1888 | 18,000 | 1,320 | 126 | 2,164 | 625 | 5,024 |
| 1889 | 13,100 | 980 | 812 | 2,283 | 556 | 4,590 |
| 1890 | 12,000 | 977 | 505 | 1,608 | 1,334 | 3,429 |
| 1891 | 8,200 | 792 | 442 | 1,375 | 1,844 | 4,454 |
| 1892 | 5,563 | 848 | 728 | 1,393 | 5,867 | 5,680 |
| 1893 | 6,614 | 869 | 1,012 | 1,200 | 3,187 | 6,120 |
| 1894 | 7,235 | 1,005 | 1,200 | 348 | 5,341 | 4,930 |
| 1895 | 7,050 | 1,100 | 163 | 2,703 | 5,023 | 5,400 |
| 1896 | 6,200 | 1,335 | 1,906 | 1,236 | 2,303 | 5,000 |
| 1897 | 4,700 | 3,605 | 1,550 | ..... | 2,709 | 6,200 |
| Total | 961,921 | 140,820 | 106,754 | 92,938 | 86,996 | 101,617 |

a Production from 1858 to 1866 was 17,455 flasks; no yearly details obtainable; they are in the product of "various mines."

*Total product of quicksilver in the United States*—Continued.

[Flasks of 76½ pounds, net.]

| Year. | Great Eastern. | Mirabel. | Ætna. | Altoona. | Abbott. | Various mines. | Total yearly production of California mines. |
|---|---|---|---|---|---|---|---|
| 1850 | ..... | ..... | ..... | ..... | ..... | ..... | 7,723 |
| 1851 | ..... | ..... | ..... | ..... | ..... | ..... | 27,779 |
| 1852 | ..... | ..... | ..... | ..... | ..... | 4,099 | 20,000 |
| 1853 | ..... | ..... | ..... | ..... | ..... | ..... | 22,284 |
| 1854 | ..... | ..... | ..... | ..... | ..... | ..... | 30,004 |
| 1855 | ..... | ..... | ..... | ..... | ..... | 3,858 | 33,000 |
| 1856 | ..... | ..... | ..... | ..... | ..... | 2,862 | 30,000 |
| 1857 | ..... | ..... | ..... | ..... | ..... | ..... | 28,204 |
| 1858 | ..... | ..... | ..... | ..... | ..... | 5,239 | 31,000 |
| 1859 | ..... | ..... | ..... | ..... | ..... | 11,706 | 13,000 |
| 1860 | ..... | ..... | ..... | ..... | ..... | 2,939 | 10,000 |
| 1861 | ..... | ..... | ..... | ..... | ..... | 571 | 35,000 |
| 1862 | ..... | ..... | ..... | ..... | ..... | 1,885 | 42,000 |
| 1863 | ..... | ..... | ..... | ..... | ..... | 6,876 | 40,531 |
| 1864 | ..... | ..... | ..... | ..... | ..... | 3,086 | 47,489 |
| 1865 | ..... | ..... | ..... | ..... | ..... | 2,261 | 53,000 |
| 1866 | ..... | ..... | ..... | ..... | ..... | 2,621 | 46,550 |
| 1867 | ..... | ..... | ..... | ..... | ..... | 3,184 | 47,000 |
| 1868 | ..... | ..... | ..... | ..... | ..... | 1,234 | 47,728 |
| 1869 | ..... | ..... | ..... | ..... | ..... | 1,580 | 33,811 |
| 1870 | ..... | ..... | ..... | ..... | ..... | 1,220 | 30,077 |
| 1871 | ..... | ..... | ..... | ..... | ..... | 2,810 | 31,686 |
| 1872 | ..... | ..... | ..... | ..... | ..... | 1,830 | 31,621 |
| 1873 | ..... | ..... | ..... | ..... | ..... | 5,231 | 27,642 |
| 1874 | ..... | ..... | ..... | ..... | ..... | 3,388 | 27,756 |
| 1875 | 412 | ..... | ..... | ..... | ..... | 11,489 | 50,250 |
| 1876 | 387 | ..... | ..... | ..... | ..... | 22,063 | 72,716 |
| 1877 | 505 | ..... | ..... | ..... | ..... | 20,101 | 79,395 |
| 1878 | 1,366 | ..... | ..... | ..... | ..... | 17,361 | 63,880 |
| 1879 | 1,455 | ..... | ..... | ..... | ..... | 23,587 | 73,684 |
| 1880 | 1,279 | ..... | ..... | ..... | ..... | 8,270 | 59,926 |
| 1881 | 1,065 | ..... | ..... | ..... | ..... | 5,812 | 60,851 |
| 1882 | 2,124 | ..... | ..... | ..... | ..... | 1,379 | 52,732 |
| 1883 | 1,669 | ..... | ..... | ..... | ..... | 185 | 46,725 |
| 1884 | 332 | ..... | ..... | ..... | ..... | 1,186 | 31,913 |
| 1885 | 446 | ..... | ..... | ..... | ..... | 427 | 32,073 |
| 1886 | 735 | ..... | ..... | ..... | ..... | 786 | 29,981 |
| 1887 | 689 | 1,543 | ..... | ..... | ..... | 520 | [a]33,825 |
| 1888 | 1,151 | 3,848 | ..... | ..... | ..... | 992 | 33,250 |
| 1889 | 1,345 | 1,874 | ..... | ..... | ..... | 924 | 26,464 |
| 1890 | 1,046 | 1,290 | ..... | ..... | ..... | 737 | 22,926 |
| 1891 | 1,660 | 1,686 | ..... | ..... | ..... | 2,451 | 22,904 |
| 1892 | 1,630 | 3,208 | 1,592 | ..... | 672 | 812 | 27,993 |
| 1893 | 1,445 | 5,211 | 3,795 | ..... | 133 | 578 | 30,164 |
| 1894 | 1,368 | 4,214 | 3,575 | ..... | 1,200 | ..... | 30,416 |
| 1895 | 1,813 | 3,900 | 3,300 | 3,926 | 1,223 | 466 | 36,067 |
| 1896 | 1,126 | 1,114 | 3,800 | 4,205 | 1,200 | 1,340 | 30,765 |
| 1897 | [b]1,538 | 375 | 3,600 | 838 | 475 | 1,101 | 26,691 |
| Total | 26,586 | 28,263 | 19,662 | 8,969 | 4,903 | 191,047 | 1,770,476 |

[a] Includes 65 flasks from Oregon.

[b] Including Mount Jackson.

## IMPORTS.

In the following table is given a statement of the imports of quicksilver from 1867 to 1897:

*Quicksilver imported and entered for consumption in the United States, 1867 to 1897, inclusive.*

| Year ending— | Quantity. | Value. | Year ending— | Quantity. | Value. |
|---|---|---|---|---|---|
| June 30— | *Pounds.* | | June 30— | *Pounds.* | |
| 1867 | ..... | $15,248 | 1883 | 1,552,738 | $593,367 |
| 1868 | 152 | 68 | 1884 | 136,615 | 44,035 |
| 1869 | ..... | 11 | 1885 | 257,659 | 90,416 |
| 1870 | 239,223 | 107,646 | Dec. 31— | | |
| 1871 | 304,965 | 137,332 | 1886 | 629,888 | 249,411 |
| 1872 | 370,353 | 189,943 | 1887 | 419,934 | 171,431 |
| 1873 | 99,898 | 74,146 | 1888 | 132,850 | 56,997 |
| 1874 | 51,202 | 52,093 | 1889 | 341,514 | 162,064 |
| 1875 | 6,870 | 20,957 | 1890 | 802,871 | 445,807 |
| 1876 | 78,902 | 50,164 | 1891 | 123,966 | 61,355 |
| 1877 | 38,250 | 19,558 | 1892 | 96,318 | 40,133 |
| 1878 | 294,207 | 135,178 | 1893 | 41,772 | 17,400 |
| 1879 | 519,125 | 217,707 | 1894 | 7 | 6 |
| 1880 | 116,700 | 48,463 | 1895 | 15,001 | 7,008 |
| 1881 | 138,517 | 57,733 | 1896 | 305 | 118 |
| 1882 | 597,898 | 233,057 | 1897 | 45,539 | 20,147 |

# NICKEL AND COBALT.

## PRODUCTION.

As in the previous year the product of nickel and cobalt was limited to the by-product obtained in lead smelting at Mine La Motte, Missouri. The production of nickel from this source increased from 17,170 pounds in 1896, valued at $4,464, to 23,707 pounds in 1897, valued at $7,823. The ruling price in 1897 for refined nickel was 33 cents per pound.

Cobalt oxide from the same source also increased from 10,700 pounds to 19,520 pounds. Its price remained at $1.60 per pound from first hands.

The principal interest in the nickel industry continued to be the importation of nickel matte from Canada. This increased from 23,718,411 pounds in 1896 to 27,821,232 pounds between January 1 and December 31, 1897. This increased importation was accompanied by increased exports of nickel products, which is shown in the following tables.

The following tables show the production of nickel and of cobalt oxide in the United States during the years stated:

*Production of nickel from domestic ores in the United States during the years 1887 to 1897.*

| Year. | Amount. | Value. |
|---|---|---|
| | *Pounds.* | |
| 1887 | 205,566 | $133,200 |
| 1888 | 204,328 | 127,632 |
| 1889 | 252,663 | 151,598 |
| 1890 | 223,488 | 134,093 |
| 1891 | 118,498 | 71,099 |
| 1892 | 92,252 | 50,739 |
| 1893 | 49,399 | 22,197 |
| 1894 | 9,616 | 3,269 |
| 1895 | 10,302 | 3,091 |
| 1896 | 17,170 | 4,464 |
| 1897 | 23,707 | 7,823 |

*Production of cobalt oxide in the United States, 1869 to 1897.*

| Year. | Pounds. | Year. | Pounds. | Year. | Pounds. |
|---|---|---|---|---|---|
| 1869 | 811 | 1879 | 4,376 | 1889 | 13,955 |
| 1870 | 3,854 | 1880 | 7,251 | 1890 | 6,788 |
| 1871 | 5,086 | 1881 | 8,280 | 1891 | 7,200 |
| 1872 | 5,749 | 1882 | 11,653 | 1892 | 7,869 |
| 1873 | 5,128 | 1883 | 1,096 | 1893 | 8,422 |
| 1874 | 4,145 | 1884 | 2,000 | 1894 | 6,763 |
| 1875 | 3,441 | 1885 | 8,423 | 1895 | 14,458 |
| 1876 | 5,162 | 1886 | 8,689 | 1896 | 10,700 |
| 1877 | 7,328 | 1887 | a18,340 | 1897 | 19,520 |
| 1878 | 4,508 | 1888 | 8,491 | | |

a Including cobalt oxide in ore and matte.

## IMPORTS AND EXPORTS.

In the following tables are given the statistics of the imports of cobalt oxide and of nickel into the United States from 1868 to 1897:

*Cobalt oxide imported and entered for consumption in the United States, 1868 to 1897.*

| Year ending— | Oxide. | | Year ending— | Oxide. | |
|---|---|---|---|---|---|
| | Quantity. | Value. | | Quantity. | Value. |
| June 30— | *Pounds.* | | June 30— | *Pounds.* | |
| 1868 | ..... | $7,208 | 1884 | 25,963 | $43,611 |
| 1869 | ..... | 2,330 | 1885 | 16,162 | 28,138 |
| 1870 | ..... | 5,019 | Dec. 31— | | |
| 1871 | ..... | 2,766 | 1886 | 19,366 | 29,543 |
| 1872 | ..... | 4,920 | 1887 | 26,882 | 39,396 |
| 1873 | 1,480 | 4,714 | 1888 | 27,446 | 46,211 |
| 1874 | 1,404 | 5,500 | 1889 | 41,455 | 82,332 |
| 1875 | 678 | 2,604 | 1890 | 33,338 | 63,202 |
| 1876 | 4,440 | 11,180 | 1891 | 23,643 | 43,188 |
| 1877 | 19,752 | 11,056 | 1892 | 32,833 | 60,067 |
| 1878 | 2,860 | 8,693 | 1893 | 28,884 | 42,694 |
| 1879 | 7,531 | 15,208 | 1894 | 24,020 | 29,857 |
| 1880 | 9,819 | 18,457 | 1895 | 36,155 | 39,839 |
| 1881 | 21,844 | 13,837 | 1896 | 27,180 | 36,212 |
| 1882 | 17,758 | 12,764 | 1897 | 24,771 | 34,773 |
| 1883 | 13,067 | 22,323 | | | |

*Nickel imported and entered for consumption in the United States, 1868 to 1897.*

| Year ending— | Nickel. | | Nickel oxide, alloy of nickel with copper, and nickel matte. | | Total value. |
|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | |
| June 30— | *Pounds.* | | *Pounds.* | | |
| 1868 | ..... | $118,058 | ..... | ..... | $118,058 |
| 1869 | ..... | 134,327 | ..... | ..... | 134,327 |
| 1870 | ..... | 99,111 | ..... | ..... | 99,111 |
| 1871 | 17,701 | 48,133 | 4,438 | $3,911 | 52,044 |
| 1872 | 26,140 | 27,144 | ..... | ..... | 27,144 |
| 1873 | 2,842 | 4,717 | ..... | ..... | 4,717 |
| 1874 | 3,172 | 5,883 | ..... | ..... | 5,883 |
| 1875 | 1,255 | 3,157 | 12 | 36 | 3,193 |
| 1876 | ..... | ..... | 156 | 10 | 10 |
| 1877 | 5,978 | 9,522 | 716 | 824 | 10,346 |
| 1878 | 7,486 | 8,837 | 8,518 | 7,847 | 16,684 |
| 1879 | 10,496 | 7,829 | 8,314 | 5,570 | 13,399 |
| 1880 | 38,276 | 25,758 | 61,869 | 40,311 | 66,069 |
| 1881 | 17,933 | 14,503 | 135,744 | 107,627 | 122,130 |
| 1882 | 22,906 | 17,924 | 177,822 | 125,736 | 143,660 |
| 1883 | 19,015 | 13,098 | 161,159 | 119,386 | 132,484 |
| 1884 | ..... | ..... | *a* 194,711 | 129,733 | 129,733 |
| 1885 | ..... | ..... | 105,603 | 64,166 | 64,166 |
| Dec. 31— | | | | | |
| 1886 | ..... | ..... | 277,112 | 141,546 | *b* 141,546 |
| 1887 | ..... | ..... | 439,037 | 205,232 | *c* 205,232 |
| 1888 | ..... | ..... | 316,895 | 138,290 | *d* 138,290 |
| 1889 | ..... | ..... | 367,288 | 156,331 | *e* 156,331 |
| 1890 | *f* 566,571 | 260,665 | 247,299 | 115,614 | 376,279 |
| 1891 | 355,455 | 172,476 | *g* 10,245,200 | 148,687 | 321,163 |
| 1892 | ..... | ..... | *h* 4,487,890 | 428,062 | 428,062 |
| 1893 | ..... | ..... | *h* 12,427,986 | 386,740 | 386,740 |
| 1894 | ..... | ..... | *h* 9,286,733 | 310,581 | 310,581 |
| 1895 | ..... | ..... | *h* 20,355,749 | 629,910 | 629,910 |
| 1896 | ..... | ..... | *h* 23,718,411 | 620,425 | 620,425 |
| 1897 | ..... | ..... | *h* 27,821,232 | 781,483 | 781,483 |

*a* Including metallic nickel.

*b* Including $465 worth of manufactured nickel.

*c* Including $879 worth of manufactured nickel.

*d* Including $2,281 worth of manufactured nickel.

*e* Including $131 worth of manufactured nickel.

*f* Classified as nickel, nickel oxide, alloy of any kind in which nickel is the element or material of chief value.

*g* Classified as nickel and nickel matte.

*h* Includes all nickel imports except manufactures; nearly all of this is nickel in matte from Canada, containing about 20 per cent nickel.

*Exports of nickel oxide and matte from the United States from 1894 to 1897.*

| Year. | Quantity. | Value. |
|---|---|---|
| | *Pounds.* | |
| 1894 (*a*) | 1,235,588 | $247,568 |
| 1895 | 1,061,285 | 239,897 |
| 1896 | 2,756,604 | 606,833 |
| 1897 | 4,255,558 | 997,391 |

*a* Latter six months; not separately classified prior to July 1, 1894.

# ANTIMONY.

By EDWARD W. PARKER.

## OCCURRENCE.

Stibnite, or sulphide of antimony, is the usual form in which the metal occurs in nature, but it is also found in combination with other minerals. Among these compounds are berthierite (antimony, iron, and sulphur), wolfsbergite (antimony, copper, and sulphur), bleinierite (antimony, lead, and sulphur), boulangerite, etc. It is also found associated with silver and sulphur, and as antimonial silver and antimonial nickel. Rarely it occurs in pure metallic state. Occasionally it is found as an oxide, known as valentinite. This form has been reported in small quantities in Utah. The only commercial product obtained in the United States has been in the form of stibnite. Workable deposits do not exist east of the Mississippi River, and the western deposits have only been worked on a small scale. The States west of the Mississippi in which ores of antimony have been mined are Arkansas, California, Idaho, Montana, Nevada, and Utah. Mr. D. F. Hamilton of Monarch, Colorado, reports an interesting occurrence of antimony in a spur of the Sawatch Range in Chaffee County, Colorado, between the Monarch and White Pine mining districts. The antimony occurs in a vein of quartz 15 to 20 feet wide, and in sight for about 300 feet on the surface. It is in a region intersected by dikes of porphyry greatly eroded by glaciation. The vein has a strike nearly north and south, and is located about 3 miles from the Denver and Rio Grande Railroad, which is easily reached by wagon road. The locality is about 11,000 feet above sea level. Mr. Hamilton says that he has been informed that the antimony can be panned from the quartz in grains somewhat larger than wheat. The antimony is of tin-white color and easily cut with a knife. A sample about the size of a walnut of a similarly colored antimony ore has been received by the Geological Survey, but the location of the deposit from which it came was not stated.

## PRODUCTION.

Antimony ore, or stibnite, was mined in five States in 1896. These were California, Idaho, Montana, Nevada, and Utah. The total amount of ore produced was 489 tons, worth $8,864. This domestic ore repre-

*Antimony and antimony ore imported and entered for consumption, etc.*—Continued.

| Year ending— | Crude and regulus. | | Ore. | | Ground. Value. | Total value. |
|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | | |
| | *Pounds.* | | *Pounds.* | | | |
| June 30, 1879.. | 1,380,212 | $143,099 | 34,542 | $2,341 | ..... | $145,440 |
| 1880.. | 2,019,389 | 265,773 | 25,150 | 2,349 | ..... | 268,122 |
| 1881.. | 1,808,945 | 253,054 | 841,730 | 18,199 | ..... | 271,253 |
| 1882.. | 2,525,838 | 294,234 | 1,114,699 | 18,019 | ..... | 312,253 |
| 1883.. | 3,064,050 | 286,892 | 697,244 | 11,254 | ..... | 298,146 |
| 1884.. | 1,779,337 | 150,435 | 231,360 | 6,489 | ..... | 156,924 |
| 1885.. | 2,579,840 | 207,215 | 215,913 | 7,497 | ..... | 214,712 |
| Dec. 31, 1886.. | 2,997,985 | 202,563 | 218,366 | 9,761 | ..... | 212,324 |
| 1887.. | 2,553,284 | 169,747 | 362,761 | 8,785 | ..... | 178,532 |
| 1888.. | 2,814,044 | 248,015 | 68,040 | 2,178 | ..... | 250,193 |
| 1889.. | 2,676,130 | 304,711 | 146,309 | 5,568 | ..... | 310,279 |
| 1890.. | 3,315,659 | 411,960 | 611,140 | 29,878 | ..... | 441,838 |
| 1891.. | 2,618,941 | 327,307 | 1,433,531 | 36,232 | ..... | 363,539 |
| 1892.. | 3,950,864 | 392,761 | 192,344 | 7,338 | ..... | 400,099 |
| 1893.. | 2,780,432 | 243,341 | 116,495 | 5,253 | ..... | 248,594 |
| 1894.. | 2,653,487 | 193,988 | 375,468 | 18,068 | $737 | 212,793 |
| 1895.. | 3,499,901 | 223,968 | 668,610 | 14,718 | ..... | 238,686 |
| 1896.. | 2,576,371 | 158,975 | 1,180,828 | 21,402 | ..... | 180,377 |
| 1897.. | 2,282,245 | 143,370 | 3,719,186 | 55,400 | ..... | 198,770 |

## PRICES.

A review of the prices of antimony ruling during the past seven years shows a history of steady decline. At the beginning of 1890 the price for Cookson's brand was 22½ cents per pound. During 1895 the price ranged from 7¾ to 8½ cents, and in 1896 a shade lower than this. It will thus be seen that in five years there was a decline of over 66⅔ per cent in price. Since 1892 the decline has been about 50 per cent. In January of that year Cookson's was quoted at 15½ to 16 cents per pound. By December the price had fallen to 11¼ cents. During 1893 prices continued to decline slowly until 10 cents was reached, and in 1894, under continued depression, 8½ cents was quoted before the close of the year. The lowest price reached in 1895 was 7¾ cents, in 1896, 7⅛ cents, and fell to 7 cents during July and August, 1897. The latter part of 1897 showed a slight improvement, the lowest price for Cookson's during the last four months of the year being 8 cents, and the highest 8½ cents per pound.

The following tables show by months and years the ruling prices of the several brands of antimony as reported to the *Iron Age* from 1892 to 1897, inclusive:

*Prices of antimony at New York since 1892, by months.*

[Cents per pound.]

| Month. | 1892. | | | 1893. | | |
|---|---|---|---|---|---|---|
| | Cookson's. | L. X. | Hallett's. | Cookson's. | L. X. | Hallett's. |
| January | 15½ to 16 | 12 to 15 | 12½ to 12⅝ | 11 | 10½ | 10½ |
| February | 15 to 15½ | 12 to 14 | 11½ | 10⅝ | 10½ | 9⅞ to 10 |
| March | 14¾ to 15 | 11¾ to 13 | 10¾ to 11⅛ | 10⅝ | 10 to 12 | 10 |
| April | 14½ to 15½ | 12½ to 12½ | 10⅞ to 11 | 10¾ | 10⅝ | 10 |
| May | 15 | 12¾ | 11⅛ | 10½ | 10½ | 10 |
| June | 14½ | 12⅝ | 11½ | 10½ | 10½ | 9⅞ |
| July | 13½ | 12½ | 10⅞ | 10⅝ | 10⅛ | 9⅞ |
| August | 12 | 11½ | 10⅝ | 10½ | 10 | 9¾ |
| September | 11½ to 11¾ | 11 to 11½ | 10 to 10½ | 10½ | 10 | 9¾ |
| October | 12 | 11½ | 10⅜ to 10¾ | 10½ | 10 | 9¾ |
| November | 11¾ | 11 | 10½ | 10 | 9¾ | 9⅝ |
| December | 11½ | 11 | 10½ to 10⅝ | 10⅛ to 10½ | 9½ to 9⅝ | 9⅛ to 9½ |

| Month. | 1894. | | | 1895. | | |
|---|---|---|---|---|---|---|
| | Cookson's. | Hallett's. | L. X. | Cookson's. | Hallett's. | Japanese. |
| January | 10½ | 9½ | 9⅛ | 8½ to 8⅝ | 7⅛ to 7½ | ..... |
| February | 10 | 9⅜ | 8⅞ | 8½ to 8½ | 7⅛ to 7½ | ..... |
| March | 10⅛ | 9½ | 8⅞ | 8½ | 7⅛ to 7½ | ..... |
| April | 10⅛ | 9⅜ | 8⅞ | 7⅞ to 8⅛ | 7 to 7⅛ | 6⅞ to 7 |
| May | 10⅛ | 9½ | 8¾ | 7⅞ to 8 | 7 | 6⅞ |
| June | 9¾ | 9⅛ | 8⅝ | 7⅞ to 8 | 7 to 7⅛ | 6⅞ |
| July | 10 | 8¾ | 8⅜ | 8 to 8⅛ | 7⅛ to 7½ | 7 |
| August | 10 | 8⅞ | 8½ | 8 | 7⅛ | 7 |
| September | 9½ | 8⅞ | 7⅝ | 8 | 7⅛ | 6⅞ to 7 |
| October | 9⅜ | 8½ | 7½ | 7¾ to 8 | 7 to 7⅛ | 6⅞ |
| November | 8½ | 8½ | 7⅜ | 7¾ to 7⅞ | 7 | 6¾ to 6⅞ |
| December | 8⅜ | 8⅛ | 7⅜ | 7¾ to 7⅞ | 6⅞ to 7 | 6¾ to 6⅞ |

*Prices of antimony at New York since 1892, by months*—Continued.

[Cents per pound.]

| Month. | 1896. | | | 1897. | | |
|---|---|---|---|---|---|---|
| | Cookson's. | Hallett's. | Japanese. | Cookson's. | Hallett's. | Japanese. |
| January | 8¼ | 7¼ to 7½ | 7 | 7¼ to 7½ | 6½ to 6¾ | 6⅜ to 6⅝ |
| February | 8¼ | 7½ | 7 | 7¼ to 7½ | 6⅝ to 6⅞ | 6½ to 6¾ |
| March | 8¼ | 7½ | 7 | 7¼ to 7½ | 6¾ to 7⅛ | 6⅝ to 7 |
| April | 8¼ | 7½ | 7 | 7¼ to 7½ | 7 to 7⅛ | 7 to 7⅛ |
| May | 8 to 8¼ | 7¼ to 7½ | 6⅞ to 7 | 7¼ to 7⅝ | 7 to 7¼ | 6¾ to 7¼ |
| June | 8 | 7¼ | 6⅞ to 7 | 7¼ to 7½ | 6½ to 7 | 6½ to 6¾ |
| July | 8 | 7¼ | 6⅞ to 7 | 7 to 7¾ | 6⅞ to 7½ | 6¾ |
| August | 8 | 7¼ | 6⅝ to 7 | 7 to 8¼ | 7⅜ to 7½ | 6¾ to 7 |
| September | 8 | 7¼ | 6⅝ to 7 | 8 to 8¼ | 7¼ to 7½ | 7 to 7¼ |
| October | 7¼ to 7⅜ | 6½ | 6⅜ | 8 to 8½ | 7¼ to 7½ | 7 to 7⅛ |
| November | 7⅛ to 7⅜ | 6⅜ to 6½ | 6¼ to 6⅜ | 8 to 8½ | 7¼ to 7½ | 7 to 7¼ |
| December | 7¼ to 7½ | 6½ | 6⅜ | 8 to 8¼ | 7¼ to 7⅜ | 7 to 7¼ |

# CHROMIC IRON ORE.

## INTRODUCTION.

The production of chrome iron ore in California was discontinued during 1897, owing to facilities for obtaining richer ore at lower prices from the deposits in Asia Minor, which are described in the following pages. It is not improbable, however, that small quantities of chrome iron ore will continue to come from the Pacific coast.

## PRODUCTION.

The production in the United States from 1885 to 1897 has been as follows:

*Production of chromic iron ore in the United States from 1885 to 1897.*

| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| | *Long tons.* | | | *Long tons.* | |
| 1885 | 2,700 | $40,000 | 1892 | 1,500 | $25,000 |
| 1886 | 2,000 | 30,000 | 1893 | 1,450 | 21,750 |
| 1887 | 3,000 | 40,000 | 1894 | 3,680 | 53,231 |
| 1888 | 1,500 | 20,000 | 1895 | 1,740 | 16,795 |
| 1889 | 2,000 | 30,000 | 1896 | 786 | 6,667 |
| 1890 | 3,599 | 53,985 | 1897 | | |
| 1891 | 1,372 | 20,580 | | | |

## IMPORTS.

The following table shows the imports of chrome ore, chromate and bichromate of potash, and chromic acid imported and entered for consumption into the United States from 1867 to 1897:

*Chromate and bichromate of potash, chromic acid, and chrome ore imported and entered for consumption in the United States, 1867 to 1897, inclusive.*

| Years ending— | Chromate and bichromate of potash. | | Chromic acid. | | Chrome ore. | | Total value. |
|---|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | Quantity. | Value. | |
| June 30— | *Pounds.* | | *Pounds.* | | *Long tons.* | | |
| 1867 | 875,205 | $88,787 | ..... | ..... | ..... | ..... | $88,787 |
| 1868 | 777,855 | 68,634 | ..... | ..... | ..... | ..... | 68,634 |
| 1869 | 877,432 | 78,288 | ..... | $3 | ..... | ..... | 78,291 |
| 1870 | 1,235,946 | 127,333 | ..... | 8 | ..... | ..... | 127,341 |
| 1871 | 2,170,473 | 223,529 | ..... | 5 | ..... | ..... | 223,534 |
| 1872 | 1,174,274 | 220,111 | 514 | 49 | ..... | ..... | 220,160 |
| 1873 | 1,121,357 | 178,472 | 922 | 276 | ..... | ..... | 178,748 |
| 1874 | 1,387,051 | 218,517 | 44 | 13 | ..... | ..... | 218,530 |
| 1875 | 1,417,812 | 183,424 | 45 | 22 | ..... | ..... | 183,446 |
| 1876 | 1,665,011 | 175,795 | 120 | 45 | ..... | ..... | 175,840 |
| 1877 | 2,471,669 | 264,392 | 13 | 10 | ..... | ..... | 264,402 |
| 1878 | 1,929,670 | 211,136 | 32 | 35 | ..... | ..... | 211,171 |
| 1879 | 2,624,403 | 221,151 | ..... | ..... | ..... | ..... | 221,151 |
| 1880 | 3,505,740 | 350,279 | 5 | 3 | ..... | ..... | 350,282 |
| 1881 | 4,404,237 | 402,088 | 124 | 89 | ..... | ..... | 402,177 |
| 1882 | 2,449,875 | 261,006 | 52 | 42 | ..... | ..... | 261,048 |
| 1883 | 1,990,140 | 208,681 | 290 | 338 | ..... | ..... | 209,019 |
| 1884 | 2,593,115 | 210,677 | ..... | 120 | 2,677 | $73,586 | 284,383 |
| 1885 | 1,448,539 | 92,556 | ..... | 39 | 12 | 239 | 92,834 |
| Dec. 31— | | | | | | | |
| 1886 | 1,985,809 | 139,117 | ..... | 101 | 3,356 | 43,721 | 182,949 |
| 1887 | 1,722,465 | 120,305 | ..... | 5,571 | 1,404 | 20,812 | 146,668 |
| 1888 | 1,755,489 | 143,312 | ..... | 281 | 4,440 | 46,735 | 190,328 |
| 1889 | 1,580,385 | 137,263 | ..... | 2,974 | 5,474 | 50,782 | 191,019 |
| 1890 | 1,304,185 | 113,613 | ..... | 634 | 4,353 | 57,111 | 171,358 |
| 1891 | 755,254 | 55,897 | 634 | 203 | 4,459 | 108,764 | 165,297 |
| 1892 | 496,972 | 94,055 | 772 | 204 | 4,930 | 55,579 | 149,838 |
| 1893 | 976,706 | 78,981 | 3,708 | 641 | 6,354 | 58,629 | 138,251 |
| 1894 | 1,483,762 | 125,796 | 5,680 | 837 | 3,470 | 38,364 | 164,997 |
| 1895 | 2,045,910 | 181,242 | 2,083 | 414 | 5,230 | 82,845 | 264,501 |
| 1896 | 952,794 | 80,538 | 2,429 | 387 | 8,669 | 187,400 | 268,325 |
| 1897 | 1,329,473 | 108,497 | 71,220 | 5,457 | 11,570 | 187,439 | 301,393 |

# THE CHROME ORES OF TURKEY.

By WILLIAM GLENN.

*Districts.*—The high officials at Constantinople divide the Turkish chrome regions into two chief ones: The European field and the Asiatic field.

The principal European chrome province is that of Uskup, on the river Vardar, the ores from which reach Salonica, whence they are shipped. There is also a lesser province, that of Adrianople, on the river Maritza.

The Asiatic region is by far the more important one. As regards abundance of ores it stands without a rival in any land. It will suit our present purpose to divide the Asiatic region into two provinces: That of the government of Broussa and that of the government of Smyrna.

The chrome province of Broussa is that which was discovered by our countryman, Dr. J. Lawrence Smith, in 1848, while employed in studying the mineral wealth of the Ottoman Empire. His original discovery was made just south of the city, but subsequently chrome ores were found to exist over an area reaching far northward and eastward well into the government of Eski Shehir. It is in this one of our assumed divisions that the comparatively enormous mines of chrome ores exist. By means of pack trains and of ox carts they are brought to the railway, on which they are hauled to ports on the Sea of Marmora.

The lesser Asiatic chrome province is that of the government of Smyrna. While its mines are important and valuable, they are not so numerous or extensive as are those of the Broussa province. There is no railway for the transport of these ores. They are packed on camels to Makri and shipped thence into Europe and America and the British Isles.

*Production.*—Leaving out of consideration the regions supplying small quantities of chrome ores, which safely may be done in this account, the world's market knows but two chief areas of production. The ores of the lesser region are called Australian, and their quantity is about 8,000 tons annually. The greater area is that of the Ottoman Empire, the yearly production of which is not known. The Turkish Government has not kept statistics of the chrome ore produced in its realm.

The officials of the department of mines and forests at Constantinople now are trying to compile statistics of the chrome ores mined in the Empire during the years from 1894 to 1898, and they are making some progress; but their task is much heavier than apparently it should be, because of the peculiar way in which government mining affairs have been conducted heretofore. These statistics seem to be a

first attempt at ascertaining the mineral wealth of the Empire. The work is being done by trained and competent officials of the department of mines, and they are apt to succeed in due time.

Those familiar with the Turkish chrome ore industry are entirely out of accord as to how much is mined in an average year. Nevertheless, as their ideas are better founded than those which the reader might evolve for himself, it may be said that the production of Turkish chrome ores is somewhere between 17,000 tons and 35,000 tons in an average year, which statement does not embody much information.

*Royalty.*—The mines of the Ottoman Empire are the property of the Sultan. The operators of them are all concessionnaires of one kind or another, and all of them pay tribute to the imperial Government. There are various methods of doing this. Most of them appear to pay a fixed sum for each ton of ore shipped. The most important concessionnaire, himself an official of the Sultan's household, pays for his concession an annual rental in money, in addition to a definite quantity of the ore itself, which is delivered by him at a seaport. But no matter in what form paid, the tax per ton is a considerable sum of money.

*Conditions of occurrence.*—The best obtainable information is to the effect that the Turkish chrome mines are similar to those in the United States, Canada, the Urals, Australia, and New Caledonia, and elsewhere. They are open pits, or quarries. They reach to various depths below the present surface; but the greater part of them do not extend deeper than 20 meters; then the ores cease. To put this statement in another form, all chrome mines are ore pockets. After a fairly exhaustive attempt to inform himself, the writer is compelled to say that he knows of but a single exception to this behavior of chrome mines. The Woods Mine, of Pennsylvania, is a genuine and astonishing one. As the writer has stated elsewhere, "It is as truly an ore chute—a vein—as are the copper mines at Capelton, in the Province of Quebec, or at Ely, or at Elizabeth, in Vermont."

The Turkish deposits conform to the general statement that, geologically, all chrome mines are alike. They are found in basic magnesian rocks, of which serpentine may be regarded as the type, and they never are found in any other class of rocks. In respect of habitat, the mineral seems to be unique. To add to it additional interest, Dr. Sterry Hunt pointed out long ago that while gold, copper, and other minerals are now being dissolved out of the rocks and deposited into what we call mines, the conditions essential to the formation of mines of chrome ore appear to be no longer present in the earth's crust.

*Transportation.*—So far as my information extends, there are but few carriage roads in European Turkey, and almost none in the Asiatic part of the Empire. Indeed, the Asiatic exhibits no desire for roads and sees little necessity for them. There is much of reason in his position. If we fully appreciate why the American Indian was right enough in not taxing himself to construct highways, then we should not

wonder that the Asiatic continues to travel over trails. To my mind, the wonder of Asiatic Turkey is not its lack of roads, but the fact of its railway which starts at Constantinople. Setting out from the suburb of Scutari, it passes around the eastern projection of the Sea of Marmora, via Ismidt and Ghemlek, to Broussa, a former capital of Asia Minor. Its direction thereafter is southeastward, along the slopes of Olympus, and onward to some point in Eski Shehir, I think. Its destination is said to be the valley of the Euphrates, a region far distant southeastward from its present terminus. In this account the importance of the railway is this: It makes more or less available the ores of much the richest chrome region known to exist on the globe. No ores were being transported during my brief stay in Turkey. The time was late winter, when the mountainous ore region was covered with snow and subject to storms which swept down upon it from the Black Sea. The transport season is from April to November.

Ore transport is chiefly by pack trains of camels. In one district, at least, a kind of cart is used, the motive power for which is oxen. In the government of Smyrna the ores are transported by animals direct to the seaports. In the government of Broussa the pack trains move to the railway, over which the ores find transport to shipping points on the Sea of Marmora, and in all regions the movement of ore is slow and difficult and costly. At present there is almost no hope of better or cheaper transport from the mines to the shipping ports, either on the Mediterranean or the Sea of Marmora.

*Mining cost.*—No machinery is used in mining the chrome ores of European or of Asiatic Turkey. There is no present reason for expecting any change in this matter. The cost of labor is cheap and its employment may be freely indulged in. The ore regions are without establishments for repair of machinery.

Naturally the cost of mining must vary with the conditions which surround it. There are producers who do not know what it costs them simply to mine a ton of chrome ore. There are others who know but are not inclined to mention the sum. One of the well informed of them stated that the cost of mining a ton (2,240 pounds) of chrome ore from one of the good Asiatic mines was about 4 shillings (British). And that may be assumed as not far from the cost of mining a ton of chrome ore from the Turkish mines in general.

But mining is one of the least costs involved in the delivery of a ton of ore at one of the shipping ports. Transport is costly, as are the various sorts of government tax. All the items vary with the conditions surrounding the mines and the distances of them from the shipping ports. But that we may reach a definite conclusion, an approximation based on reasonable grounds, we may assume generally that when a ton of chrome ore has been delivered at a Turkish shipping port, it has cost the producer not less than 64 shillings (British). He may have done better—he may have done much worse—all depending

upon his mine, his management, and what interest he has had to pay for his capital; for nearly all of them are borrowers of the money they use, and interest is high.

*Composition.*—The ores offering in the Turkish market vary from 44 per cent to 53 per cent chromic oxide. The greater quantity is of the leaner ore, just as is true of all ores in all markets the world over. And while the Ottoman Empire possesses a great deal of high-grade chrome ore, the likelihood is that much the larger part of the production is from 44 to 46 chromic oxide. This is mixed with the higher grades and sold in cargoes of 48 to 50 chromic oxide.

*Future supply.*—Another consideration is quantity, and in that the Sultan's mines stand easily first. They have no serious rival. Considering the present consumption of chrome ore and the probable increase of it in the near future, it may safely be said that those of us now living are not apt to see any cessation of the Turkish supply. There are good reasons for believing that on the slopes of Mount Olympus alone there are now a million of tons of merchantable ore awaiting extraction from the mines. And that is only a single locality.

The sparsely settled character of the Ottoman Empire causes it to be difficult to keep in subjection the lawless elements, such as are found in all lands, for which reason it is never safe for an utter foreigner, like an American, to travel alone in the interior. But he will be well received who presents himself fully accredited before the high Turkish officials. Once his mission is known to be lawful and useful, passports and safe conduct will be supplied him for any required region of the Empire.

# PLATINUM.

By DAVID T. DAY.

## PRODUCTION.

The product of platinum during 1897 in the United States came chiefly from Trinity and Shasta counties, California, and amounted to about 150 ounces, worth in the crude state $900.

The production since 1880 has been as follows:

*Product of platinum in the United States since 1880.*

| Year. | Quantity. | Value. (a) |
|---|---|---|
| | *Ounces.* | |
| 1880 | 100 | $400 |
| 1881 | 100 | 400 |
| 1882 | 200 | 600 |
| 1883 | 200 | 600 |
| 1884 | 150 | 450 |
| 1885 | 250 | 187 |
| 1886 | 50 | 100 |
| 1887 | 448 | 1,838 |
| 1888 | 500 | 2,000 |
| 1889 | 500 | 2,000 |
| 1890 | 600 | 2,500 |
| 1891 | 100 | 500 |
| 1892 | 80 | 550 |
| 1893 | 75 | 517 |
| 1894 | 100 | 600 |
| 1895 | 150 | 900 |
| 1896 | 163 | 944 |
| 1897 | 150 | 900 |

a The chief variations in price have been due to the quality of the crude grains.

## LOCALITIES OF OCCURRENCE.

During the year 1898 a demand has developed for osmium which has greatly stimulated the search for iridosmine, and hence for all the platinum metals, since osmium either in the form of iridosmine or as an impurity in platinum and in platiniridium is almost invariably found where any of the other platinum metals occur. The demand for osmium comes from the Welsbach Light Company, of Philadelphia, who need it for the incandescent lights. It is probable that very much more will be known in the next few months concerning the distribution of the platinum metals on the Pacific slope. In fact, a general search for the platinum metals will be made by this company throughout the United States, Canada, Alaska, and South America. On the Pacific slope platinum was noticed by Siliman in the black sand obtained as the heaviest material with the gold in placer mining at Cherokee Flat, Butte County, California. Siliman speaks of it as being plentiful, and the iridosmine more plentiful than platinum, but that the miners have no way to save it. Since then platinum has been noticed on the coast of California as far south as San Bernardino County. All the work done in the search for platinum, including that of the writer during the present summer, 1898, tends to strengthen the belief that it occurs only in more or less direct association with placer sands derived from serpentine rocks, and especially those rich in chromite. A glance at the recent geological map of California, in which the occurrence of serpentine rocks and the deposits of chromite are noted in colors, will give a fair idea of the distribution of gold-bearing sand in which platinum metals have also been found. Thus, coming north from San Bernardino County, California, platinum has been obtained when washing for gold in the beach sands of the coast near Santa Barbara; again at Lompoc Beach; on the beaches of San Luis Obispo County; farther north again in the neighborhood of Santa Cruz; and it has occasionally been found between Santa Cruz and the Golden Gate. But the coast sands which have yielded the platinum metals most prolifically in California are those of Humboldt and Del Norte counties. The beach mines of Gold Bluff, north of Arcata, and the mines at Big Lagoon, Stone Lagoon, Little River, and going north those in the neighborhood of Crescent City, and coming inland from there the mines in the neighborhood of Gasquet and Smith River, have furnished considerable amounts of platinum, and would doubtless have furnished more but for the fact that the platinum is extremely fine, making it difficult to separate from iron pyrite, chromite, magnetite, and ilmenite. Further, it has contained a discouragingly large amount of iridosmine that is practically valueless; it was too fine for pen points and had no other use.

Going farther north in Oregon, the same conditions concerning the occurrence of platinum along the coast are principally noticeable at Gold Beach and at Port Orford in the Coos Bay region. Sharpless and

Winchell have carefully examined the sands at Bandon, at the mouth of Rogue River, Oregon, and found platinum almost invariably, although the proportion was smaller than has usually been reported by less careful observers. Thus, beach mining for gold, in which platinum has frequently been saved, continues as far north as Yaquina Bay, Oregon, and more or less successful efforts have been made to save the platinum associated with fine gold in the black sands of the Pacific beach north of Astoria, Oregon, and still farther north on the beaches of Washington. The saving of platinum from beach sands, however, as indicated below, reached its maximum extent in the mines of Gold Bluff, Crescent City, Gold Beach, and Port Orford.

Meanwhile, the interior of the State has also furnished platinum from the black sand associated with gold in the placers of the American River, and in Plumas, Shasta, and Trinity counties, California. In these counties both gold and platinum have usually been coarser, and thus the platinum has been more easily saved and separated from the finer grains of iridosmine. In fact, the main seat of the platinum industry of the Pacific slope has been in the Hay Fork district of Trinity County and along the Trinity River from Chapman's mine, 6 miles south of Junction City, northward to North Fork. Here both the large mines and the small Chinese workings have furnished the bulk of the platinum produced in the United States. Nuggets one-quarter of an inch in diameter have very frequently been found. In the Hay Fork district, iridium, in the form of platinum iridium or iridosmine, has been a noticeable feature. The region of Grants Pass, on the Rogue River, Oregon, has also furnished small quantities of platinum, and will probably furnish much more in the future.

Much of the general information has been obtained from the records of the California State Mining Bureau, furnished by Professor Durden and by Mr. Charles G. Yale, but was supplemented by a personal visit of the writer—in company with Col. W. E. Barrows, president of the Welsbach Light Company—to most of the inland regions which have been described.

By continuing to Portland and examining all the black sands which could be found from various points in Oregon, Idaho, and elsewhere, traces of platinum were found in sands at various points on the Snake River from Bakersville to Lewiston, and a specimen of platinum sand was also obtained from Miles City, Montana.

In regard to the conditions of occurrence of platinum in California and Oregon, the general statement that the black sands are richer as one proceeds farther north should be modified. This undoubtedly is true if one considers the coast from San Bernardino through to the northern limit of California, the richest deposit having been found in Del Norte County; and the same conditions continue in Oregon as far as Coos Bay, but above this there is no information at hand to show that the black sands farther north are richer in platinum or gold than those farther south, or, indeed, that they are so rich.

For years the region known as the Similkameen district, in British Columbia, has been looked upon as the richest source of platinum in America, and a visit to this point, which is reached most easily by a wagon drive of 120 miles south from Kamloops, British Columbia, on the Canadian Pacific Railroad, was made by Colonel Barrows and the writer. It was found that there are large bodies of serpentine containing chromite near the headwaters of Tulameen and Granite branches of the Similkameen River, and below this the sands of both creeks are remarkably rich in the platinum metals.

Platinum has also been found on Slate Creek, which empties into the Tulameen River a short distance above Granite Creek. This region is particularly interesting because of the characteristics of the platinum grains found there. It is practically easy to determine whether a given nugget of platinum was found on the Similkameen River proper, or whether it came from the region of the Tulameen or Granite Creek district. In the latter case the nuggets are usually black and very magnetic, due probably to the fact that they are frequently coated with either magnetite or magnetite and chromite, or with some oxidation product of pyrrhotite. The platinum sand coming from the Similkameen River, on the contrary, is bright, as though the greater part of the coating had been rubbed away. There is every indication that the platinum of Granite Creek is in close proximity to the original source. This fact is made particularly evident by the finding of a platinum nugget to which a considerable amount of the mother rock was still attached. This rock proves to be peridotite, mixed with chromite and magnetite. A careful search will be made of the various rocks in the vicinity, with the probability of finding platinum in place.

In regard to the proportion of platinum metals to gold, the only direct evidence was the fact that at the Pogue mine, operated by Mr. T. H. Murphy, about 20 ounces of coarse platinum, the principal nuggets one-fourth inch in diameter, were found in mining 100 ounces of gold dust, and this proportion can be taken as perhaps fairly representative of the district, although the proportion must necessarily vary considerably, because not all either of gold or platinum is saved, the fine gold and fine platinum usually being put aside with the black sand to be worked up at some future day. The total output of platinum in the Similkameen district has declined very greatly. In fact, the large output for one or two years, about 1886, was due to a clean up of various lots of black sand, rich in platinum, which had accumulated for several years. The output of 1897 did not vary considerably from 200 ounces.

Word was received that a considerable proportion of platinum was found with the gold of the Caribou district, 250 miles north of Ashcroft, British Columbia, and Mr. W. Pellew Harvey, of Vancouver, has found $\frac{3}{100}$ of an ounce per ton in the unconcentrated sand of the Saskatchawan River, 60 miles up the river from Edmonton, British Columbia. It is said that the Edmonton black sand is regularly purchased for shipment abroad, in order to obtain platinum from it.

## PLATINUM IN RUSSIA.[1]

Platinum is produced only in the Ural, in the mining districts of Perm and Verhotursk. In the following table is shown the production by works in 1896, the last year for which any official figures are available:

*Production of platinum in Russia in 1896, by mines.*

| Name of mine. | Production. |
|---|---|
| | *Troy ounces.* |
| Goroblagodat | 116,980 |
| Nizhne-Tagilski | 31,288 |
| Krestovozdvizhenskie | 23,635 |
| Nikolaye-Pavdinski | 1,573 |
| Bogolovski Mining Co | 362 |
| Total | 173,838 |

In 1896, as well as in preceding years, the largest quantity of the output was produced in the Goroblagodat region, viz, 116,980 ounces, or a little over two-thirds of the entire product. Next follow the mines of the Nizhne-Tagilski works with 31,288 ounces, or 18 per cent, and the Krestovozdvizhenskie with an output of 23,635 ounces, or 13½ per cent of the total. Compared with 1895, when the production was 155,646 ounces, the output of platinum increased by 18,192 ounces, or nearly 12 per cent, owing principally to the increased demand and good prices paid for the metal.

The production of platinum in Russia during the four latest years for which statistics are obtainable is given in the subjoined table, which also demonstrates that the rank of the producing mines has remained the same.

*Production, by mines, of platinum in Russia, from 1893 to 1896.*

| Mines. | 1893. | 1894. | 1895. | 1896. |
|---|---|---|---|---|
| | *Ounces.* | *Ounces.* | *Ounces.* | *Ounces.* |
| Goroblagodat | 107,267 | 108,242 | 94,045 | 116,980 |
| Nizhne-Tagilski | 44,702 | 45,625 | 36,558 | 31,288 |
| Krestovozdvizhenskie | 22,342 | 23,045 | 22,091 | 23,635 |
| All other | 5,490 | 6,752 | 2,952 | 1,935 |
| Total | 179,801 | 183,664 | 155,646 | 173,838 |

[1] Authority: Sbornik Statisticheskyh Svyedyenii o Gornozavodskoi promyshlennosti, Rossii 1894 i 1895, Otchet Gornava Departmenta za 1896 goda, St. Petersburg, 1897.

The production and value of platinum for a series of years, and also the production of this metal for the twelve years from 1885 to 1896, are given in the two following tables:

*Production and value of platinum in Russia, from 1893 to 1896.*

| Year. | Production. | Value. | Average price per ounce. |
|---|---|---|---|
| | *Ounces.* | | |
| 1893 | 179,801 | $1,765,669 | $9.83 |
| 1894 | 183,664 | 1,714,020 | 9.33 |
| 1895 | 155,646 | 1,701,623 | 10.93 |
| 1896 | 173,838 | 2,085,930 | 12.00 |

*Production of platinum in Russia for twelve years, 1885 to 1896.*

| Year. | Production. | Year. | Production. |
|---|---|---|---|
| | *Ounces.* | | *Ounces.* |
| 1885 | 91,944 | 1893 | 179,801 |
| 1886 | 152,195 | 1894 | 183,664 |
| 1887 | 155,415 | 1895 | 155,646 |
| 1888 | 95,799 | 1896 | 173,838 |
| 1889 | 92,946 | Total, twelve years | 1,692,136 |
| 1890 | 100,289 | | |
| 1891 | 149,365 | | |
| 1892 | 161,234 | Average yearly output | 141,011 |

The year 1894 represents the greatest quantity of platinum obtained in any one year. Of this amount (183,664 ounces) 181,029 ounces of platinum were washed out of 1,833,219 short tons of platinum-bearing sand, while the remaining 2,635 ounces were washed out of gold-bearing sand. In 1895 there were washed 1,728,816 short tons of platinum-bearing sand, yielding 154,862 ounces of platinum, besides a small amount, 784 ounces, obtained from gold bearing sand.

*Establishments for refining platinum.*—The crude platinum obtained from the mines, before being put to use, is subjected to a refining process. This is done in various establishments, but mainly in foreign ones, and consequently a large part of the metal produced is exported in the crude state over the frontier. In Russia there exist only two establishments refining platinum: The Tentelevski Chemical Works, and the laboratory of Kolbe & Lindfors. Both are located at St. Petersburg, and are under the supervision of the mining department. The former of these establishments in 1896 purchased 1,343 ounces of the crude platinum, from which 1,114 ounces of pure metal were pro-

duced; the Kolbe & Lindfors laboratory in 1896 neither bought nor refined any platinum.

Two new companies were formed in 1896 for the production of gold, platinum, and associated metals.

## OSMIUM-IRIDIUM.

This metal is obtained from only one locality—the Miasski gold mine in the government of Orenburg. The production for the last three years for which any information can be obtained is given in the following table:

*Production of osmium-iridium in Russia for the years 1894, 1895, and 1896.*

| Year. | Production. |
|---|---|
| | *Ounces.* |
| 1894 | 125 |
| 1895 | 159 |
| 1896 | 224 |

The production in 1896 shows an increase over that of 1895 of 65 ounces, or nearly 41 per cent.

# COAL.

By EDWARD W. PARKER.

## INTRODUCTION.

The usual methods employed in the preparation of the reports on the production of coal for previous volumes of Mineral Resources have been continued in the present paper. The statistical tables showing the production in 1897 in the several States have been compiled from direct returns of operators to the Survey or its duly appointed agents, with only one exception. As formerly, the statistics of coal production in Illinois have been obtained from the report of the State Bureau of Labor Statistics. In connection with his duties as chief mine inspector of Alabama, Mr. James D. Hillhouse has continued to act as an agent for the Geological Survey in collecting the statistics for that State. The report on the production of anthracite coal in Pennsylvania has been prepared, as usual, by Mr. William W. Ruley, of Philadelphia. The cooperation of mining inspectors or other State officials has been asked and cordially given, notably in Colorado, Ohio, and Pennsylvania, in securing reports from producers who had failed to respond to the inquiries sent from this office. Acknowledgment is due and gratefully made to these gentlemen who have so willingly assisted in the preparation of the report. The author desires also to make special acknowledgment of the efficient services rendered by Mr. Theodore H. Johnson, who for a number of years has borne the burdens of tabulating the returns from between 3,000 and 4,000 coal producers, and preparing the tables of production by fields, States and counties, and of compiling the statistics relating to mining machines, the strike of 1897, and rates paid for mining coal, which have been made special features of this report.

To the coal operators themselves, who have contributed to the completeness of this and previous reports by furnishing statements of their production, the Survey is also, and in no less degree, indebted. It is an evidence that the value of the statistical work of the Geological Survey is becoming more thoroughly appreciated when operators respond more promptly and willingly with each successive year. By this willing cooperation on the part of the producers the work of the Survey is made more accurate and complete, and the prompt publication

by far the most important. The product of these fields in 1887 was 55,193,034 short tons, or nearly 63 per cent of the total yield of bituminous coal. In 1897 the Appalachian fields produced 97,308,137 short tons, or 65.8 per cent of the total output, and 42,115,103 short tons, or 76.3 per cent in excess of their yield, in 1887. Second in importance in the bituminous coal areas is the Central coal fields, comprising those of Illinois, Indiana, and western Kentucky, which produced 14,478,883 short tons, or 16½ per cent of the total bituminous product, in 1887, and 26,414,127 short tons, or 17.9 per cent of the total, in 1897. The Western field, embracing all the States west of the Mississippi River and east of the Rocky Mountains, is third in importance, with a product of 10,193,034 short tons in 1887 and 13,164,059 short tons in 1897, the percentage in the two years being 11.6 and 8.9, respectively. The Rocky Mountain fields are fourth in importance, yielding 4.15 per cent of the total bituminous product in 1887 and 5.99 per cent in 1897. The Pacific Coast field yielded not quite 1 per cent of the total product in 1887 and 1.11 per cent in 1897. The production of these five fields, with their percentages of the total bituminous output in the two years, the increase and percentage of increase in each, was as follows:

*Production of the five principal bituminous coal fields in 1887 and 1897 compared.*

| Fields. | 1887. | | 1897. | | Increase in 1897. | |
|---|---|---|---|---|---|---|
| | Product. | Per cent of total. | Product. | Per cent of total. | Amount. | Per cent. |
| | *Short tons.* | | *Short tons.* | | *Short tons.* | |
| Appalachian .. | 55, 193, 034 | 63. 0 | 97, 308, 137 | 65. 8 | 42, 115, 103 | 76. 3 |
| Central ..... | 14, 478, 883 | 16. 5 | 26, 414, 127 | 17. 9 | 11, 935, 244 | 82. 4 |
| Western ..... | 10, 193, 034 | 11. 6 | 13, 164, 059 | 8. 9 | 2, 971, 025 | 29. 1 |
| Rocky Mountain..... | 3, 646, 280 | 4. 15 | 8, 854, 182 | 5. 99 | 5, 207, 902 | 142. 8 |
| Pacific Coast.. | 854, 308 | 1. 0 | 1, 639, 779 | 1. 11 | 785, 471 | 91. 9 |

The following table contains the approximate areas of the coal fields in the various States, grouped according to the divisions mentioned, with the total output from each from 1887 to 1897:

*Classification of the coal fields of the United States.*

| | Area. | Product in— | | |
|---|---|---|---|---|
| | | 1887. | 1888. | 1889. |
| *Anthracite.* | | | | |
| New England (Rhode Island and Massachusetts) | *Sq. miles.* 500 | *Short tons.* 6,000 | *Short tons.* 4,000 | *Short tons.* 2,000 |
| Pennsylvania | 480 | 39,506,255 | 43,922,897 | 45,544,970 |
| Colorado and New Mexico | 15 | 36,000 | 44,791 | 53,517 |
| | 995 | 39,548,255 | 43,971,688 | 45,600,487 |
| *Bituminous.* (a) | | | | |
| Triassic: | | | | |
| Virginia | 180 | 30,000 | 33,000 | 49,411 |
| North Carolina | 2,700 | ..... | ..... | 222 |
| Appalachian: | | | | |
| Pennsylvania | 9,000 | 31,516,856 | 30,796,727 | 36,174,089 |
| Ohio | 10,000 | 10,301,708 | 10,910,951 | 9,976,787 |
| Maryland | 550 | 3,278,023 | 3,479,470 | 2,939,715 |
| Virginia | 2,000 | 795,263 | 1,040,000 | 816,375 |
| West Virginia | 16,000 | 4,881,620 | 5,498,800 | 6,231,880 |
| Kentucky | 11,180 | 950,903 | 1,193,000 | 1,108,770 |
| Tennessee | 5,100 | 1,900,000 | 1,967,297 | 1,925,689 |
| Georgia | 200 | 313,715 | 180,000 | 225,934 |
| Alabama | 8,660 | 1,950,000 | 2,900,000 | 3,572,983 |
| | 62,690 | 55,888,088 | 60,966,245 | 62,972,222 |
| Northern: | | | | |
| Michigan | 6,700 | 71,461 | 81,407 | 67,431 |
| Central: | | | | |
| Indiana | 6,450 | 3,217,711 | 3,140,979 | 2,845,057 |
| Kentucky | 4,500 | 982,282 | 1,377,000 | 1,290,985 |
| Illinois | 36,800 | 10,278,890 | 14,655,188 | 12,104,272 |
| | 47,750 | 14,478,883 | 19,173,167 | 16,240,314 |

a Including lignite, brown coal, and scattering lots of anthracite.

*Classification of the coal fields of the United States*—Continued.

| | Area. | Product in— | | |
|---|---|---|---|---|
| | | 1887. | 1888. | 1889. |
| *Bituminous* (*a*)—Continued. | | | | |
| Western: | *Sq. miles.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Iowa | 18,000 | 4,473,828 | 4,952,440 | 4,045,358 |
| Missouri | 26,700 | 3,209,916 | 3,909,967 | 2,557,823 |
| Nebraska | 3,200 | 1,500 | 1,500 | 2,222,543 |
| Kansas | 17,000 | 1,596,879 | 1,850,000 | |
| Arkansas | 9,100 | 129,600 | 276,871 | 279,584 |
| Indian Territory | 20,000 | 685,911 | 761,986 | 752,832 |
| Texas | 4,500 | 75,000 | 90,000 | 128,216 |
| | 98,500 | 10,172,634 | 11,842,764 | 10,036,356 |
| Rocky Mountain, etc.: | | | | |
| Dakota | ..... | 21,470 | 34,000 | 28,907 |
| Montana | ..... | 10,202 | 41,467 | 363,301 |
| Idaho | ..... | 500 | 400 | ..... |
| Wyoming | ..... | 1,170,318 | 1,481,540 | 1,388,947 |
| Utah | ..... | 180,021 | 258,961 | 236,651 |
| Colorado | 2,913 | 1,755,735 | 2,140,686 | 2,544,144 |
| New Mexico | ..... | 508,034 | 626,665 | 486,463 |
| | ..... | 3,646,280 | 4,583,719 | 5,048,413 |
| Pacific Coast: | | | | |
| Washington | ..... | 772,612 | 1,215,750 | 1,030,578 |
| Oregon | ..... | 31,696 | 75,000 | 64,359 |
| California | ..... | 50,000 | 95,000 | 119,820 |
| | ..... | 854,308 | 1,385,750 | 1,214,757 |
| Total product sold | ..... | 124,689,909 | 142,037,740 | ..... |
| Colliery consumption | ..... | 5,960,302 | 6,621,667 | ..... |
| Total product, including colliery consumption | ..... | 130,650,211 | 148,659,407 | 141,229,613 |

*a* Including lignite, brown coal, and scattering lots of anthracite.

*Classification of the coal fields of the United States*—Continued.

| | Product in— | | | |
|---|---|---|---|---|
| | 1890. | 1891. | 1892. | 1893. |
| *Anthracite.* | | | | |
| New England (Rhode Island and Massachusetts) | *Short tons.* ..... | *Short tons.* 500 | *Short tons.* ..... | *Short tons.* ..... |
| Pennsylvania | 46,468,641 | 50,665,431 | 52,472,504 | 53,967,543 |
| Colorado and New Mexico | (*a*) | (*a*) | 64,963 | 93,578 |
| | 46,468,641 | 50,665,931 | 52,537,467 | 54,061,121 |
| *Bituminous.* (*b*) | | | | |
| Triassic: | | | | |
| Virginia | 19,346 | 17,290 | 37,219 | 19,878 |
| North Carolina | 10,262 | 20,355 | 6,679 | 17,000 |
| Appalachian: | | | | |
| Pennsylvania | 42,302,173 | 42,788,490 | 46,694,576 | 44,070,724 |
| Ohio | 11,494,506 | 12,868,683 | 13,562,927 | 13,253,646 |
| Maryland | 3,357,813 | 3,820,239 | 3,419,962 | 3,716,041 |
| Virginia | 764,665 | 719,109 | 637,986 | 800,461 |
| West Virginia | 7,394,494 | 9,220,665 | 9,738,755 | 10,708,578 |
| Kentucky | 1,206,120 | 1,222,918 | 1,231,110 | 1,245,785 |
| Tennessee | 2,169,585 | 2,413,678 | 2,092,064 | 1,902,258 |
| Georgia | 228,337 | 171,000 | 215,498 | 372,740 |
| Alabama | 4,090,409 | 4,759,781 | 5,529,312 | 5,136,935 |
| | 73,008,102 | 77,984,563 | 83,122,190 | 81,207,168 |
| Northern: | | | | |
| Michigan | 74,977 | 80,307 | 77,990 | 45,979 |
| Central: | | | | |
| Indiana | 3,305,737 | 2,973,474 | 3,345,174 | 3,791,851 |
| Kentucky | 1,495,376 | 1,693,151 | 1,794,203 | 1,761,394 |
| Illinois | 15,274,727 | 15,660,698 | 17,862,276 | 19,949,564 |
| | 20,075,840 | 20,327,323 | 23,001,653 | 25,502,809 |

*a* Included in bituminous product.
*b* Including lignite, brown coal, and scattering lots of anthracite.

*Classification of the coal fields of the United States*—Continued.

| | Product in— | | | |
|---|---|---|---|---|
| | 1890. | 1891. | 1892. | 1893. |
| *Bituminous* (*a*)—Cont'd. | | | | |
| Western: | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Iowa | 4,021,739 | 3,825,495 | 3,918,491 | 3,972,229 |
| Missouri | 2,735,221 | 2,674,606 | 2,733,949 | 2,897,442 |
| Nebraska | 2,259,922 | 1,500 | 1,500 | ..... |
| Kansas | | 2,716,705 | 3,007,276 | 2,652,546 |
| Arkansas | 399,888 | 542,379 | 535,558 | 574,763 |
| Indian Territory | 869,229 | 1,091,032 | 1,192,721 | 1,252,110 |
| Texas | 184,440 | 172,100 | 245,690 | 302,206 |
| | 10,470,439 | 11,023,817 | 11,635,185 | 11,651,296 |
| Rocky Mountain, etc.: | | | | |
| Dakota | 30,000 | 30,000 | 40,725 | 49,630 |
| Montana | 517,477 | 541,861 | 564,648 | 892,309 |
| Wyoming | 1,870,366 | 2,327,841 | 2,503,839 | 2,439,311 |
| Utah | 318,159 | 371,045 | 361,013 | 413,205 |
| Colorado | 3,094,003 | 3,512,632 | 3,447,967 | 4,018,793 |
| New Mexico | 375,777 | 462,328 | 659,230 | 655,112 |
| | 6,205,782 | 7,245,707 | 7,577,422 | 8,468,360 |
| Pacific Coast: | | | | |
| Washington | 1,263,689 | 1,056,249 | 1,213,427 | 1,264,877 |
| Oregon | 61,514 | 51,826 | 34,661 | 41,683 |
| California | 110,711 | 93,301 | 85,178 | 72,603 |
| | 1,435,914 | 1,201,376 | 1,333,266 | 1,379,163 |
| Total product, including colliery consumption | 157,770,963 | 168,566,669 | 179,329,071 | 182,352,774 |

*a* Including lignite, brown coal, and scattered lots of anthracite.

*Classification of the coal fields of the United States*—Continued.

| | Product in— | | | |
|---|---|---|---|---|
| | 1894. | 1895. | 1896. | 1897. |
| *Anthracite.* | | | | |
| New England (Rhode Island and Massachusetts) | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Pennsylvania | 51,921,121 | 57,999,337 | 54,346,081 | 52,431,763 |
| Colorado and New Mexico | 71,550 | 67,179 | 79,492 | 69,076 |
| | 51,992,671 | 58,066,516 | 54,425,573 | 52,500,839 |
| *Bituminous.* (*a*) | | | | |
| Triassic: | | | | |
| Virginia | 52,079 | 57,782 | 95,670 | 95,670 |
| North Carolina | 16,900 | 24,900 | 7,813 | 21,280 |
| Appalachian: | | | | |
| Pennsylvania | 39,912,463 | 50,217,228 | 49,557,453 | 54,597,891 |
| Ohio | 11,909,856 | 13,355,806 | 12,875,202 | 12,196,942 |
| Maryland | 3,501,428 | 3,915,585 | 4,143,936 | 4,442,128 |
| Virginia | 1,177,004 | 1,310,542 | 1,159,053 | 1,432,632 |
| West Virginia | 11,627,757 | 11,387,961 | 12,876,296 | 14,248,159 |
| Kentucky | 1,218,072 | 1,490,057 | 1,486,016 | 1,411,897 |
| Tennessee | 2,180,879 | 2,535,644 | 2,663,106 | 2,888,849 |
| Georgia | 354,111 | 260,998 | 238,546 | 195,869 |
| Alabama | 4,397,178 | 5,693,775 | 5,748,697 | 5,893,770 |
| | 76,278,748 | 90,167,596 | 90,748,305 | 97,308,137 |
| Northern: | | | | |
| Michigan | 70,022 | 112,322 | 92,882 | 223,592 |
| Central: | | | | |
| Indiana | 3,423,921 | 3,995,892 | 3,905,779 | 4,151,169 |
| Kentucky | 1,893,120 | 1,867,713 | 1,847,462 | 2,190,200 |
| Illinois | 17,113,576 | 17,735,864 | 19,786,626 | 20,072,758 |
| | 22,430,617 | 23,599,469 | 25,539,867 | 26,414,127 |

*a* Including lignite, brown coal, and scattering lots of anthracite.

*Classification of the coal fields of the United States*—Continued.

| | Product in— | | | |
|---|---|---|---|---|
| | 1894. | 1895. | 1896. | 1897. |
| *Bituminous* (*a*)—Cont'd. | | | | |
| Western: | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Iowa | 3,967,253 | 4,156,074 | 3,954,028 | 4,611,865 |
| Missouri | 2,245,039 | 2,372,393 | 2,331,542 | 2,665,626 |
| Nebraska | ..... | ..... | 3,560 | *b* 645 |
| Kansas | 3,388,251 | 2,926,870 | 2,884,801 | 3,054,012 |
| Arkansas | 512,626 | 598,322 | 675,374 | 856,190 |
| Indian Territory | 969,606 | 1,211,185 | 1,366,646 | 1,338,380 |
| Texas | 420,848 | 484,959 | 544,015 | 639,341 |
| | 11,503,623 | 11,749,803 | 11,759,966 | 13,164,059 |
| Rocky Mountain, etc.: | | | | |
| Dakota | 42,015 | 39,197 | 78,050 | 77,246 |
| Montana | 927,395 | 1,504,193 | 1,543,445 | 1,647,882 |
| Wyoming | 2,417,463 | 2,246,911 | 2,229,624 | 2,597,886 |
| Utah | 431,550 | 471,836 | 418,627 | 521,560 |
| Colorado | 2,776,817 | 3,027,327 | 3,054,711 | 3,307,644 |
| New Mexico | 580,238 | 709,130 | 600,823 | 701,964 |
| Nevada | 150 | ..... | ..... | ..... |
| | 7,175,628 | 7,998,594 | 7,925,280 | 8,854,182 |
| Pacific Coast: | | | | |
| Washington | 1,106,470 | 1,191,410 | 1,195,504 | 1,434,112 |
| Oregon | 47,521 | 73,685 | 101,721 | 101,755 |
| California | 67,247 | 75,453 | *c* 93,776 | *c* 103,912 |
| | 1,221,238 | 1,340,548 | 1,391,001 | 1,639,779 |
| Total product, including colliery consumption | 170,741,526 | 193,117,530 | 191,986,357 | 200,221,665 |

*a* Including lignite, brown coal, and scattering lots of anthracite.
*b* Includes Idaho. *c* Includes Alaska.

## PRODUCTION.

For the first time in our history the production of coal in the United States has reached a total of 200,000,000 short tons. This statement carries with it the announcement that the output of coal in 1897 reached the highest figure ever recorded. The total product last year amounted to 200,221,665 short tons, equivalent to 178,769,344 long tons of 2,240 pounds, with an aggregate value at the mines of $198,869,178. The largest output previously obtained was in 1895,

tons, against 16,420,252 tons in 1896, and 6,211,732 tons in 1891. Operators report that the amount of coal mined by machines increases the output per miner by from 50 to 100 per cent. The average price paid for hand mining is about 50 cents per ton. The increase of about 6,229,000 tons of machine-mined coal in 1897 over 1896 would, with an increase of 50 per cent in the efficiency per miner, represent a saving of about $1,000,000 in the mining cost alone. A further economy is accomplished in a larger percentage of lump coal when mined by machines. The inference to be drawn from the statistics of the past few years is that operators have been inclined to utilize machine mining in the effort to increase production rather than to decrease the number of employees, and the benefits that might be derived from lessened expenses are partly lost by keeping the production in excess of a natural demand.

In considering the coal product these reports include not only the coal marketed, either by shipment to distant points or sold locally, but also that consumed by the mine employees and by the mine operators themselves in locomotives, under stationary boilers, etc., in working the mine, and technically known as colliery consumption. There are occasional exceptions, where operators use only slack or waste, which would otherwise be thrown on the dump and no record kept, the miner not even being paid for it. These exceptions are few and the amount so comparatively small as not to materially affect the total. Coal consumed in the manufacture of coke is also included in this report.

The coal shipped, sold to local trade and employees, and used in the manufacture of coke is considered the marketable product. The colliery consumption averages about 8 per cent of the total product in anthracite production and about 1½ per cent in bituminous mining. The marketable product in 1897 amounted to 193,280,246 short tons as compared with 184,801,525 short tons in 1896.

## ANTHRACITE.

The product of Pennsylvania anthracite in 1897 was 46,814,074 long tons, or 52,431,763 short tons, valued at $79,129,126, against 48,523,287 long tons, or 54,346,081 short tons, valued at $81,748,651 in 1896, and 51,785,122 long tons, or 57,999,337 short tons valued at $82,019,272 in 1895. Compared with 1896 the production of anthracite coal in 1897 shows a decrease of 1,709,213 long tons, or 1,914,318 short tons. The maximum yearly product of anthracite coal was reached in 1895, compared with which the output in 1897 shows a loss of 4,971,048 long tons, or 5,567,574 short tons. In fact the amount of anthracite coal mined in 1897 was the smallest in six years, with the exception of 1894, when, because of the panic, the production fell off to 46,358,144 long tons, about 450,000 long tons less than the output of 1897. The increase of over 5,000,000 tons in the production for 1895 indicates that the industry had recovered from the effects of the financial panic, and other causes

formity of the "fixed charges," etc., is proportionately increased, while every additional advance in the price produces a diminution in the market demand, and offers an opportunity for the increased consumption of soft coal, coke, or gas, as the case may be. Under the prevailing conditions there is reason to believe that the maximum of anthracite production has been, or soon will be, reached. It is certainly safe to predict that the demand will never exceed the present capacity of the anthracite mines.

In addition to the anthracite production of Pennsylvania in 1897, there were 69,076 short tons mined in Colorado and New Mexico, making the total output of anthracite coal in the United States 52,500,839 short tons. Except in the preceding tables, the anthracite product of Colorado and New Mexico, for sake of convenience, is included in the bituminous product, and, unless expressly stated to the contrary, reference in this chapter to anthracite production means that of Pennsylvania only.

As previously stated, the miners in the anthracite fields endeavor to offset the days of idleness, caused by the shutting down of the mines two or three days in the week, by increasing their tonnage on working days. This is shown in the fact that, while the total product in 1897 was only 3.5 per cent less than in 1896, the average working time fell off nearly 14 per cent, and the number of employees was nearly the same in both years. The number of men employed in 1896 was 148,991, who worked an average of 174 days. In 1897 the average number of working days was 150—less than one-half the number of working days in a year—and the number of men employed was 149,557. In 1894, 131,603 men made an average of 190 days, and in 1895, 142,917 men made an average of 196 days. From this it will be seen that the miners made a little less than two-thirds time in 1894 and 1895, somewhat less than three-fifths time in 1896, and less than half time in 1897. The tonnage per man per day in 1894 and 1895 averaged 1.85. In 1896 it increased to 1.87, and in 1897, with increased effort, the average tonnage per man per day increased to 2.09.

The "number of men employed" includes, besides the miners, the day laborers inside and outside the mines, teamsters, mechanics, etc. The tonnage per miner, therefore, would be considerably in excess of the figures given; but as no separation of the number of miners has been made it is not possible to ascertain their average tonnage. Taking the total number of employees, we find that the number of tons produced for each man in 1894 was 251.5; in 1895 each man produced 362.6 tons; in 1896 the total for each man was 325.4, while in 1897, notwithstanding the larger tonnage per man per day, the total tonnage for each man employed was only 313.5. If each employee were a miner, this would indicate a loss of 15 per cent in his earning capacity, provided the rate paid per ton remained constant. The difference would be even greater if the tonnage per miner could be shown.

## BITUMINOUS.

The bituminous coal product, as collated in these reports, includes, in addition to strictly bituminous coals, semibituminous, semianthracite, cannel, splint, and "block" coals, and lignite or brown coal. The anthracite coal mined in Colorado and New Mexico is also included in the bituminous product. The aggregate output of these in 1897 amounted to 147,789,902 short tons, valued at $119,740,052, against 137,640,276 short tons, valued at $114,891,515, in 1896, and 135,118,193 short tons, worth $115,779,771, in 1895. It is seen from this that while the product in 1897 was somewhat more than 10,000,000 short tons in excess of the product in 1896, and more than 12,500,000 over that of 1895, the value of the product in 1897 was less than $5,000,000 more than that of 1896, and only $4,000,000 more than that of 1895.

The production of 147,789,902 tons of bituminous coal in 1897 makes that the banner year in the history of coal mining. Production has shown an increase each year since 1889, with one exception (1894), and with three exceptions the production has increased each year since 1880. In 1880, according to the Tenth Census, the amount of bituminous coal produced in the United States was 42,831,758 short tons. In the seventeen years following that the production has increased annually (with three exceptions) until, in 1897, the output was nearly 3.5 times that of 1880. At the time of taking the Eleventh Census (in 1889) the bituminous coal product was 95,684,543 short tons, showing that in the eight years since 1889 the product has increased nearly 55 per cent.

The value of the bituminous product has not increased in the same proportion. While the amount of coal produced in 1897 was 3.5 more than that of 1880, the value was only two and one-fourth times as much. The average price per ton received for the product in 1880 was $1.25, whereas in 1897 it had fallen to 81 cents, a decline of about 35 per cent. The average price per ton has not exceeded $1 since 1887. Once before (in 1884) it had fallen below that figure, but recovered in the following year. There has been no reaction against the decline in price since 1887, and the average price per ton obtained in 1897 is the lowest ever recorded. There were two years in which, with a smaller output, the value exceeded that of 1897. In 1892 the product was nearly 21,000,000 tons less than that of 1897, while the value exceeded it by more than $5,000,000. The value of the product in 1893 was $3,000,000 more than that of 1897, while the amount was more than 19,000,000 tons less.

The increased production of bituminous coal and the decreased price were due partly to the use of mining machines. Sixty per cent of the increased product in 1897 was the increased amount mined by machines. The details of the machine mined product are discussed in another part of this report. Increased activity in the iron and steel industries in 1897 is responsible for a considerable increase in the demand for bitumi-

nous coal, while the gradual diminution of the supply of natural gas also tends to enhance the consumption of soft coal. The remarkable feature of the industry in 1897 was that the increased production was effected in spite of a bitterly contested strike, which lasted from July 5 until the latter part of September, and which affected the competitive fields in eastern Pennsylvania, Ohio, Indiana, Illinois, and a part of West Virginia. The Survey has taken great care to collect the statistics regarding this and other strikes which prevailed during the year, and the results are given in tabulated form in a subsequent part of the report. It is pertinent to state here, however, that in only one of the States affected was there a decrease in the production. Ohio's production fell off 678,260 tons. There were only three other States in which there was a decreased production. The total decrease in these three States was only about 60,000 tons, and they were not affected by the big strike.

Including the Territory of Alaska, there were thirty-one States and Territories producing coal in 1897. Two of these, Idaho and Nebraska, might be excluded without appreciable effect upon the total, as their combined product amounted to but 645 short tons. As in 1896, there were eighteen States whose product exceeded 1,000,000 tons. Two of these exceeded 20,000,000 tons and four exceeded 10,000,000 tons. Only two of these eighteen States had a decreased production in 1897. These were Ohio and the Indian Territory. Illinois enjoyed the solitary distinction of an output exceeding that of 1896 with a decrease in the value. There were eleven States in 1897 producing more than 3,000,000 tons of bituminous coal, as compared with ten in 1896, Kansas having passed that figure for the third time in her history. Three of these eleven States are west of the Mississippi River—Colorado, Iowa, and Kansas. The other eight were Alabama, Illinois, Indiana, Kentucky, Maryland, Ohio, Pennsylvania, and West Virginia. The total bituminous coal product of the eight Eastern States was 119,204,914 short tons, an average of nearly 15,000,000 tons each; the three Western States aggregated 11,027,580 short tons, an average of about 3,675,000 tons. There were in all thirteen coal-producing States east of the Mississippi River, whose aggregate product in 1897, exclusive of Pennsylvania anthracite, was 124,062,806 short tons, against eighteen States west of the Mississippi River, whose product aggregated 23,727,096 short tons.

Pennsylvania, of course, maintains her position as the premier coal producer, having an output of 54,597,891 short tons of bituminous coal in addition to 52,431,763 short tons of anthracite. The output of bituminous coal in Pennsylvania during 1897 was 37 per cent of the total bituminous product and 27 per cent of the entire output of the country, while the combined product of anthracite and bituminous coal in Pennsylvania was 53 per cent of the total for the United States. Illinois retains its position as second in importance, with 13½ per cent of the bituminous product and 10 per cent of the total. West Virginia

increased her lead over Ohio more than 2,000,000 tons, giving her substantial title to third place, with a little less than 10 per cent of the bituminous product and a little over 7 per cent of the total. If West Virginia continues to increase her production in the same proportion for the next few years as she has done in the last decade, the State will occupy second place before ten years more are added to her history. Since 1886 her product has increased 250 per cent, while the output in Illinois in the same time has increased 117 per cent.

Ohio now ranks fourth as a coal producer, having been displaced by West Virginia in 1896. Her product in 1897 was 8 per cent of the bituminous output and 6 per cent of the total. Alabama continues in fifth place, with 4 per cent of the bituminous yield and not quite 3 per cent of the total. Iowa is sixth, displacing Maryland, producing 3 per cent of the one and 2.3 per cent of the other. Maryland's percentages were a little less than Iowa's, and Indiana was a little below Maryland. Kentucky, Colorado, and Kansas occupy the same positions as in 1896, standing ninth, tenth, and eleventh, respectively.

The total number of bituminous coal mines (exclusive of small local banks) which are included in the tabulated returns for 1897 was 2,455, against 2,599 in 1896, a decrease of 144. The average production per mine was not quite 53,000 short tons in 1896 and a little over 60,000 tons in 1897. The number of men employed in 1897 was 248,144, who worked an average of 196 days, against 237,665 men for 192 days in 1896. The tonnage per day for each man employed was 3.04 in both years.

The following tables show the production of all kinds of coal in the United States in 1896 and 1897, by States, with the distribution of the product for consumption, the value of the output, number of employees, and the average working time:

*Coal product of the United States in 1896, by States.*

| State. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. |
|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Alabama | 80 | 3,555,493 | 285,416 | 138,268 | 1,769,520 |
| Arkansas | 14 | 647,240 | 8,640 | 19,494 | ..... |
| California and Alaska | 5 | 80,808 | 7,897 | 5,071 | ..... |
| Colorado | 88 | 2,424,027 | 65,755 | 93,128 | 529,490 |
| Georgia and North Carolina | 3 | 125,852 | 1,170 | 9,682 | 109,655 |
| Illinois | 330 | 16,128,103 | 2,995,022 | 659,601 | 3,900 |
| Indiana | 131 | 3,471,470 | 311,911 | 113,442 | 8,956 |
| Indian Territory | 21 | 1,295,742 | 12,648 | 45,560 | 12,696 |
| Iowa | 182 | 3,360,799 | 494,443 | 91,766 | 7,020 |
| Kansas | 96 | 2,562,779 | 256,906 | 63,901 | 1,215 |
| Kentucky | 112 | 2,980,355 | 251,897 | 55,447 | 45,779 |
| Maryland | 22 | 4,068,558 | 53,046 | 22,332 | ..... |
| Michigan | 11 | 83,150 | 6,547 | 3,185 | ..... |
| Missouri | 128 | 2,047,251 | 243,029 | 41,262 | ..... |
| Montana | 21 | 1,314,873 | 27,476 | 17,676 | 183,420 |
| New Mexico | 16 | 607,319 | 6,677 | 7,446 | 1,184 |
| North Dakota | 10 | 71,447 | 6,183 | 420 | ..... |
| Ohio | 408 | 11,494,275 | 1,181,610 | 172,722 | 26,595 |
| Oregon | 8 | 88,116 | 12,951 | 654 | ..... |
| Pennsylvania | 569 | 37,696,555 | 1,570,161 | 504,224 | 9,786,513 |
| Tennessee | 45 | 1,990,538 | 43,752 | 40,343 | 588,473 |
| Texas | 16 | 522,177 | 12,846 | 8,992 | ..... |
| Utah | 15 | 340,338 | 9,171 | 7,411 | 61,707 |
| Virginia | 29 | 824,042 | 40,951 | 38,540 | 351,190 |
| Washington | 21 | 1,095,484 | 16,722 | 44,613 | 38,685 |
| West Virginia | 189 | 9,838,053 | 426,441 | 56,395 | 2,555,407 |
| Wyoming and Nebraska | 29 | 2,102,528 | 21,367 | 68,251 | 41,038 |
| Total bituminous | 2,599 | 110,817,372 | 8,370,635 | 2,329,826 | 16,122,443 |
| Pennsylvania anthracite | 355 | 48,358,783 | 1,132,292 | 4,855,006 | ..... |
| Grand total | 2,954 | 159,176,155 | 9,502,927 | 7,184,832 | 16,122,443 |

*Coal product of the United States in 1896, by States*—Continued.

| State. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|
| | *Short tons.* | | | | |
| Alabama | 5,748,697 | $5,174,135 | $0.90 | 248 | 9,894 |
| Arkansas | 675,374 | 755,577 | 1.12 | 168 | 1,507 |
| California and Alaska | 93,776 | 220.523 | 2.35 | 291 | 177 |
| Colorado | 3,112,400 | 3,606,642 | 1.16 | 172 | 6,704 |
| Georgia and North Carolina | 246,359 | 179,770 | .73 | 301 | 731 |
| Illinois | 19,786,626 | 15,809,736 | .80 | 186 | 33,054 |
| Indiana | 3,905,779 | 3,261,737 | .84 | 163 | 8,806 |
| Indian Territory | 1,366,646 | 1,918,115 | 1.40 | 170 | 3,549 |
| Iowa | 3,954,028 | 4,628,022 | 1.17 | 178 | 9,672 |
| Kansas | 2,884,801 | 3,295,032 | 1.15 | 168 | 7,127 |
| Kentucky | 3,333,478 | 2,684,306 | .78 | 165 | 7,549 |
| Maryland | 4,143,936 | 3,299,928 | .80 | 204 | 4,039 |
| Michigan | 92,882 | 150,631 | 1.62 | 157 | 320 |
| Missouri | 2,331,542 | 2,518,194 | 1.08 | 168 | 5,982 |
| Montana | 1,543,445 | 2,279,672 | 1.47 | 234 | 2,335 |
| New Mexico | 622,626 | 930,381 | 1.49 | 172 | 1,559 |
| North Dakota | 78,050 | 84,908 | 1.09 | 166 | 141 |
| Ohio | 12,875,202 | 10,253,461 | .79 | 161 | 25,500 |
| Oregon | 101,721 | 294,564 | 2.90 | 191 | 254 |
| Pennsylvania | 49,557,453 | 35,368,249 | .71 | 206 | 72,625 |
| Tennessee | 2,663,106 | 2,281,295 | .86 | 211 | 6,531 |
| Texas | 544,015 | 896,251 | 1.65 | 187 | 1,953 |
| Utah | 418,627 | 500,547 | 1.20 | 202 | 679 |
| Virginia | 1,254,723 | 848,851 | .68 | 198 | 2,510 |
| Washington | 1,195,504 | 2,396,078 | 2.00 | 221 | 2,622 |
| West Virginia | 12,876,296 | 8,336,685 | .65 | 201 | 19,078 |
| Wyoming and Nebraska | 2,233,184 | 2,918,225 | 1.37 | 210 | 2,937 |
| Total bituminous | 137,640,276 | 114,891,515 | .83 | 192 | 237,665 |
| Pennsylvania anthracite | 54,346,081 | 81,748,651 | 1.50 | 174 | 148,991 |
| Grand total | 191,986,357 | 196,640,166 | 1.02 | 185 | 386,656 |

*Coal product of the United States in 1897, by States.*

| State. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. |
|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Alabama | 78 | 4,543,597 | 86,790 | 126,187 | 1,137,196 |
| Arkansas | 14 | 827,518 | 11,588 | 18,084 | ..... |
| California<br>Alaska | 8 | 87,642 | 11,349 | 4,921 | ..... |
| Colorado | 97 | 2,649,042 | 76,699 | 93,782 | 542,180 |
| Georgia | 2 | 120,398 | 1,481 | 5,500 | 68,490 |
| Idaho<br>Nebraska | 2 | 195 | 450 | ..... | ..... |
| Illinois | 310 | 16,358,221 | 3,041,712 | 669,012 | 3,813 |
| Indiana | 115 | 3,630,499 | 393,012 | 111,376 | 16,282 |
| Indian Territory | 19 | 1,250,066 | 9,068 | 47,501 | 29,745 |
| Iowa | 162 | 4,001,311 | 516,427 | 71,494 | 22,633 |
| Kansas | 71 | 2,745,101 | 253,933 | 54,730 | 248 |
| Kentucky | 109 | 3,088,132 | 404,099 | 55,033 | 54,833 |
| Maryland | 25 | 4,391,703 | 27,762 | 22,663 | ..... |
| Michigan | 13 | 188,636 | 24,686 | 10,270 | ..... |
| Missouri | 105 | 2,384,797 | 239,686 | 41,143 | ..... |
| Montana | 22 | 1,434,858 | 29,707 | 18,410 | 164,907 |
| New Mexico | 15 | 689,423 | 7,844 | 19,714 | ..... |
| North Carolina | 1 | 21,280 | ..... | ..... | ..... |
| North Dakota | 20 | 65,032 | 10,458 | 1,756 | ..... |
| Ohio | 350 | 10,725,047 | 1,259,290 | 192,755 | 19,850 |
| Oregon | 8 | 85,903 | 15,409 | 443 | ..... |
| Pennsylvania | 575 | 40,419,846 | 1,653,049 | 556,604 | 11,968,392 |
| Tennessee | 45 | 2,150,179 | 37,620 | 39,275 | 661,775 |
| Texas | 16 | 621,635 | 8,357 | 9,349 | ..... |
| Utah | 11 | 424,770 | 22,667 | 9,198 | 64,925 |
| Virginia | 21 | 969,973 | 29,017 | 43,087 | 486,225 |
| Washington | 23 | 1,347,915 | 7,149 | 39,902 | 39,146 |
| West Virginia | 198 | 11,312,408 | 446,795 | 58,694 | 2,430,262 |
| Wyoming | 20 | 2,435,091 | 17,845 | 93,974 | 50,976 |
| Total bituminous | 2,455 | 118,969,218 | 8,643,949 | 2,414,857 | 17,761,878 |
| Pennsylvania anthracite | 349 | 46,634,408 | 1,270,793 | 4,526,562 | ..... |
| Grand total | 2,804 | 165,603,626 | 9,914,742 | 6,941,419 | 17,761,878 |

*Coal product of the United States in 1897, by States*—Continued.

| State. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|
| | *Short tons.* | | | | |
| Alabama | 5,893,770 | $5,192,085 | $0.88 | 233 | 10,597 |
| Arkansas | 856,190 | 903,993 | 1.06 | 161 | 1,990 |
| California<br>Alaska | 103,912 | 265,236 | 2.55 | 156 | 381 |
| Colorado | 3,361,703 | 3,947,186 | 1.17 | 180 | 5,852 |
| Georgia | 195,869 | 140,466 | .72 | 304 | 469 |
| Idaho<br>Nebraska | 645 | 2,150 | 3.33 | 91 | 7 |
| Illinois | 20,072,758 | 14,472,529 | .72 | 185 | 33,788 |
| Indiana | 4,151,169 | 3,472,348 | .84 | 170 | 8,886 |
| Indian Territory | 1,336,380 | 1,787,358 | 1.34 | 176 | 3,168 |
| Iowa | 4,611,865 | 5,219,503 | 1.13 | 201 | 10,703 |
| Kansas | 3,054,012 | 3,602,326 | 1.18 | 194 | 6,639 |
| Kentucky | 3,602,097 | 2,828,329 | .79 | 178 | 7,983 |
| Maryland | 4,442,128 | 3,363,996 | .76 | 262 | 4,719 |
| Michigan | 223,592 | 325,416 | 1.46 | 230 | 537 |
| Missouri | 2,665,626 | 2,887,884 | 1.08 | 191 | 6,414 |
| Montana | 1,647,882 | 2,897,408 | 1.76 | 252 | 2,337 |
| New Mexico | 716,981 | 991,611 | 1.38 | 208 | 1,659 |
| North Carolina | 21,280 | 27,000 | 1.34 | 215 | 51 |
| North Dakota | 77,246 | 83,803 | 1.08 | 168 | 170 |
| Ohio | 12,196,942 | 9,535,409 | .78 | 148 | 26,410 |
| Oregon | 101,755 | 313,890 | 3.09 | 171 | 254 |
| Pennsylvania | 54,597,891 | 37,636,347 | .69 | 205 | 77,599 |
| Tennessee | 2,888,849 | 2,329,534 | .81 | 221 | 6,337 |
| Texas | 639,341 | 972,323 | 1.52 | 220 | 1,766 |
| Utah | 521,560 | 618,230 | 1.19 | 204 | 704 |
| Virginia | 1,528,302 | 1,021,918 | .67 | 213 | 2,344 |
| Washington | 1,434,112 | 2,777,687 | 1.94 | 236 | 2,739 |
| West Virginia | 14,248,159 | 8,987,393 | .63 | 205 | 20,504 |
| Wyoming | 2,597,886 | 3,136,694 | 1.21 | 219 | 3,137 |
| Total bituminous | 147,789,902 | 119,740,052 | .81 | 196 | 248,144 |
| Pennsylvania anthracite | 52,431,763 | 79,129,126 | 1.51 | 150 | 149,557 |
| Grand total | 200,221,665 | 198,869,178 | .99 | 179 | 397,701 |

## PRODUCTION IN PREVIOUS YEARS.

The following table shows the annual production of anthracite and bituminous coal since 1880. The quantities are expressed both in long tons of 2,240 pounds and in short tons of 2,000 pounds. It will be observed that in the seventeen years from 1880 to 1897 the output of anthracite coal has increased from 25,580,189 long tons, or 28,649,811 short tons, to 46,814,074 long tons, or 52,431,763 short tons, the production in 1897 being 83 per cent more than that of 1880. The annual production of bituminous coal has increased 245 per cent from 42,831,758 short tons in 1880 to 147,789,902 tons in 1897. As compared with 1880 the value per ton of the anthracite product in 1897 shows a gain, the percentage of increase in the value being 88, against 83 per cent increase in product. The percentage of increase in the value of the bituminous product, on the other hand, was 125, or about one-half the percentage of increase in the amount.

*Annual production of coal in the United States since 1880.*

| Year. | Bituminous coal. | | |
|---|---|---|---|
| | Long tons of 2,240 pounds. | Short tons of 2,000 pounds. | Value. |
| 1880 | 38,242,641 | 42,831,758 | $53,443,718 |
| 1881 | 48,365,341 | 53,961,012 | 60,224,344 |
| 1882 | 60,861,190 | 68,164,533 | 76,076,487 |
| 1883 | 68,531,500 | 76,755,280 | 82,237,800 |
| 1884 | 73,730,539 | 82,578,204 | 77,417,066 |
| 1885 | 64,840,668 | 72,621,548 | 82,347,648 |
| 1886 | 66,646,947 | 74,644,581 | 78,481,056 |
| 1887 | 79,073,227 | 88,562,014 | 98,004,656 |
| 1888 | 91,107,002 | 102,039,843 | 101,860,529 |
| 1889 | 85,432,717 | 95,684,643 | 94,504,745 |
| 1890 | 99,377,073 | 111,302,322 | 110,420,801 |
| 1891 | 105,268,962 | 117,901,237 | 117,188,400 |
| 1892 | 113,264,792 | 126,856,567 | 125,124,381 |
| 1893 | 114,629,671 | 128,385,231 | 122,751,618 |
| 1894 | 106,089,647 | 118,820,405 | 107,653,501 |
| 1895 | 120,641,244 | 135,118,193 | 115,779,771 |
| 1896 | 122,893,104 | 137,640,276 | 114,891,515 |
| 1897 | 131,955,270 | 147,789,902 | 119,740,052 |

*Annual production of coal in the United States since 1880*—Continued.

| Year. | Pennsylvania anthracite. | | |
|---|---|---|---|
| | Long tons of 2,240 pounds. | Short tons of 2,000 pounds. | Value. |
| 1880 | 25,580,189 | 28,649,811 | $42,196,678 |
| 1881 | 28,500,016 | 31,920,018 | 64,125,036 |
| 1882 | 31,358,264 | 35,121,256 | 70,556,094 |
| 1883 | 34,336,469 | 38,456,845 | 77,257,055 |
| 1884 | 33,175,756 | 37,156,847 | 66,351,512 |
| 1885 | 34,228,548 | 38,335,974 | 76,671,948 |
| 1886 | 34,853,077 | 39,035,446 | 76,119,120 |
| 1887 | 37,578,747 | 42,088,197 | 84,552,181 |
| 1888 | 41,624,611 | 46,619,564 | 89,020,483 |
| 1889 | 40,665,152 | 45,544,970 | 65,721,578 |
| 1890 | 41,489,858 | 46,468,641 | 66,383,772 |
| 1891 | 45,236,992 | 50,665,431 | 73,944,735 |
| 1892 | 46,850,450 | 52,472,504 | 82,442,000 |
| 1893 | 48,185,306 | 53,967,543 | 85,687,078 |
| 1894 | 46,358,144 | 51,921,121 | 78,488,063 |
| 1895 | 51,785,122 | 57,999,337 | 82,019,272 |
| 1896 | 48,523,287 | 54,346,081 | 81,748,651 |
| 1897 | 46,814,074 | 52,431,763 | 79,129,126 |

| Year. | Total. | | |
|---|---|---|---|
| | Long tons. | Short tons. | Value. |
| 1880 | 63,822,830 | 71,481,569 | $95,640,396 |
| 1881 | 76,865,357 | 85,881,030 | 124,349,380 |
| 1882 | 92,219,454 | 103,285,789 | 146,632,581 |
| 1883 | 102,867,969 | 115,212,125 | 159,494,855 |
| 1884 | 106,906,295 | 119,735,051 | 143,768,578 |
| 1885 | 99,069,216 | 110,957,522 | 159,019,596 |
| 1886 | 101,500,024 | 113,680,027 | 154,600,176 |
| 1887 | 116,651,974 | 130,650,211 | 182,498,737 |
| 1888 | 132,731,613 | 148,659,407 | 190,881,012 |
| 1889 | 126,097,869 | 141,229,613 | 160,226,323 |
| 1890 | 140,866,931 | 157,770,963 | 176,804,573 |
| 1891 | 150,505,954 | 168,566,668 | 191,133,135 |
| 1892 | 160,115,242 | 179,329,071 | 207,566,381 |
| 1893 | 162,814,977 | 182,352,774 | 208,438,696 |
| 1894 | 152,447,791 | 170,741,526 | 186,141,564 |
| 1895 | 172,426,366 | 193,117,530 | 197,799,043 |
| 1896 | 171,416,390 | 191,986,357 | 196,640,166 |
| 1897 | 178,769,344 | 200,221,665 | 198,869,178 |

The statistics of production in the separate States for years prior to 1886 are so incomplete that a statement showing them would be largely a matter of guesswork and of no practical value. Since 1886 the statistics have been collected regularly and systematically by the Geological Survey, with the exception of 1889, when the information was gathered by the Eleventh United States Census. The total amount and value of coal produced in the United States from 1886 to 1897, inclusive, is shown in the following table. The quantities are expressed uniformly in short tons of 2,000 pounds.

*Amount and value of coal produced in the United States, by States and Territories, from 1886 to 1897.*

| State or Territory. | 1886. | | 1887. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Alabama | 1,800,000 | $2,574,000 | 1,950,000 | $2,535,000 |
| Arkansas | 125,000 | 200,000 | 129,600 | 194,400 |
| California | 100,000 | 300,000 | 50,000 | 150,000 |
| Colorado | 1,368,338 | 3,215,594 | 1,791,735 | 3,941,817 |
| Georgia | 223,000 | 334,500 | 313,715 | 470,573 |
| Idaho | 1,500 | 6,000 | 500 | 2,000 |
| Illinois | 9,246,435 | 10,263,543 | 10,278,890 | 11,152,596 |
| Indiana | 3,000,000 | 3,450,000 | 3,217,711 | 4,324,604 |
| Indian Territory | 534,580 | 855,328 | 685,911 | 1,286,692 |
| Iowa | 4,315,779 | 5,391,151 | 4,473,828 | 5,991,735 |
| Kansas | 1,400,000 | 1,680,000 | 1,596,879 | 2,235,631 |
| Kentucky | 1,550,000 | 1,782,500 | 1,933,185 | 2,223,163 |
| Maryland | 2,517,577 | 2,391,698 | 3,278,023 | 3,114,122 |
| Michigan | 60,434 | 90,651 | 71,461 | 107,191 |
| Missouri | 1,800,000 | 2,340,000 | 3,209,916 | 4,298,994 |
| Montana | 49,846 | 174,460 | 10,202 | 35,707 |
| Nebraska | ..... | ..... | 1,500 | 3,000 |
| New Mexico | 271,285 | 813,855 | 508,034 | 1,524,102 |
| North Dakota | 25,955 | 41,277 | 21,470 | 32,205 |
| Ohio | 8,435,211 | 8,013,450 | 10,301,708 | 9,096,848 |
| Oregon | 45,000 | 112,500 | 31,696 | 70,000 |
| Pennsylvania: | | | | |
| Anthracite | 36,696,475 | 71,558,126 | 39,506,255 | 79,365,244 |
| Bituminous | 27,094,501 | 21,016,235 | 31,516,856 | 27,806,941 |
| Rhode Island | ..... | ..... | 6,000 | 16,250 |
| Tennessee | 1,714,290 | 1,971,434 | 1,900,000 | 2,470,000 |
| Texas | 100,000 | 185,000 | 75,000 | 150,000 |
| Utah | 200,000 | 420,000 | 180,021 | 360,042 |
| Virginia | 684,951 | 684,951 | 825,263 | 773,360 |
| Washington | 423,525 | 952,931 | 772,612 | 1,699,746 |
| West Virginia | 4,005,796 | 3,805,506 | 4,881,620 | 4,594,979 |
| Wyoming | 829,355 | 2,488,065 | 1,170,318 | 3,510,954 |
| Total product sold | 108,618,833 | 147,112,755 | 124,689,909 | 173,537,896 |
| Colliery consumption | 5,061,194 | ..... | 5,960,302 | 8,960,841 |
| Total | 113,680,027 | 147,112,755 | 130,650,211 | 182,498,737 |

*Amount and value of coal produced in the United States, etc.*—Continued.

| State or Territory. | 1888. | | 1889. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Alabama | 2,900,000 | $3,335,000 | 3,572,983 | $3,961,491 |
| Arkansas | 276,871 | 415,306 | 279,584 | 395,836 |
| California | 95,000 | 380,000 | 184,179 | 434,382 |
| Colorado | 2,185,477 | 4,808,049 | 2,544,144 | 3,843,992 |
| Georgia | 180,000 | 270,000 | 226,156 | 339,382 |
| Idaho | 400 | 1,800 | ..... | ..... |
| Illinois | 14,655,188 | 16,413,811 | 12,104,272 | 11,755,203 |
| Indiana | 3,140,979 | 4,397,370 | 2,845,057 | 2,887,852 |
| Indian Territory | 761,986 | 1,432,072 | 752,832 | 1,323,807 |
| Iowa | 4,952,440 | 6,438,172 | 4,095,358 | 5,426,509 |
| Kansas | 1,850,000 | 2,775,000 | 2,221,043 | 3,297,288 |
| Kentucky | 2,570,000 | 3,084,000 | 2,399,755 | 2,374,339 |
| Maryland | 3,479,470 | 3,293,070 | 2,939,715 | 2,517,474 |
| Michigan | 81,407 | 135,221 | 67,431 | 115,011 |
| Missouri | 3,909,967 | 8,650,800 | 2,557,823 | 3,479,057 |
| Montana | 41,467 | 145,135 | 363,301 | 880,773 |
| Nebraska | 1,500 | 3,375 | 1,500 | 4,500 |
| New Mexico | 626,665 | 1,879,995 | 486,463 | 870,468 |
| North Carolina | ..... | ..... | (*a*) | ..... |
| North Dakota | 34,000 | 119,000 | 28,907 | 41,431 |
| Ohio | 10,910,951 | 10,147,180 | 9,976,787 | 9,355,400 |
| Oregon | 75,000 | 225,000 | (*b*) | ..... |
| Pennsylvania: | | | | |
| Anthracite | 43,922,897 | 85,649,649 | *c* 45,598,487 | 65,873,514 |
| Bituminous | 33,796,727 | 32,106,891 | 36,174,089 | 27,953,315 |
| Rhode Island | 4,000 | 11,000 | 2,000 | 6,000 |
| Tennessee | 1,967,297 | 2,164,026 | 1,925,689 | 2,338,309 |
| Texas | 90,0000 | 184,500 | 128,216 | 340,620 |
| Utah | 258,961 | 543,818 | 236,651 | 377,456 |
| Virginia | 1,073,000 | 1,073,000 | 865,786 | 804,475 |
| Washington | 1,215,750 | 3,647,250 | 1,030,578 | 2,393,238 |
| West Virginia | 5,498,800 | 6,048,680 | 6,231,880 | 5,086,584 |
| Wyoming | 1,481,540 | 4,444,620 | 1,388,947 | 1,748,617 |
| Total product sold. | 142,037,740 | 204,222,790 | 141,229,613 | 160,226,323 |
| Colliery consumption. | 6,621,667 | 7,295,834 | ..... | ..... |
| Total | 148,659,407 | 211,518,624 | 141,229,613 | 160,226,323 |

*a* Product included in Georgia.
*b* Product included in California.
*c* Includes product of anthracite in Colorado and New Mexico.

*Amount and value of coal produced in the United States, etc.*—Continued.

| State or Territory. | 1890. | | 1891. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Alabama | 4,090,409 | $4,202,469 | 4,759,781 | $5,087,596 |
| Arkansas | 399,888 | 514,595 | 542,379 | 647,560 |
| California | 110,711 | 283,019 | 93,301 | 204,902 |
| Colorado | 3,094,003 | 4,344,196 | 3,512,632 | 4,800,000 |
| Georgia | 228,337 | 238,315 | 171,000 | 256,500 |
| Illinois | 15,274,727 | 14,171,230 | 15,660,698 | 14,237,074 |
| Indiana | 3,305,737 | 3,259,233 | 2,973,474 | 3,070,918 |
| Indian Territory | 869,229 | 1,579,188 | 1,091,032 | 1,897,037 |
| Iowa | 4,021,739 | 4,995,739 | 3,825,495 | 4,807,999 |
| Kansas | 2,259,922 | 2,947,517 | 2,716,705 | 3,557,303 |
| Kentucky | 2,701,496 | 2,472,119 | 2,916,069 | 2,715,600 |
| Maryland | 3,357,813 | 2,899,572 | 3,820,239 | 3,082,515 |
| Michigan | 74,977 | 149,195 | 80,307 | 133,387 |
| Missouri | 2,735,221 | 3,382,858 | 2,674,606 | 3,283,242 |
| Montana | 517,477 | 1,252,492 | 541,861 | 1,228,630 |
| Nebraska | 1,500 | 4,500 | 1,500 | 4,500 |
| New Mexico | 375,777 | 504,390 | 462,328 | 779,018 |
| North Carolina | 10,262 | 17,864 | 20,355 | 39,365 |
| North Dakota | 30,000 | 42,000 | 30,000 | 42,000 |
| Ohio | 11,494,506 | 10,783,171 | 12,868,683 | 12,106,115 |
| Oregon | 61,514 | 177,875 | 51,826 | 155,478 |
| Pennsylvania: | | | | |
| Anthracite | 46,468,641 | 66,383,772 | 50,665,431 | 73,944,735 |
| Bituminous | 42,302,173 | 35,376,916 | 42,788,490 | 37,271,053 |
| Rhode Island | ..... | ..... | 500 | 10,000 |
| Tennessee | 2,169,585 | 2,395,746 | 2,413,678 | 2,668,188 |
| Texas | 184,440 | 465,900 | 172,100 | 412,360 |
| Utah | 318,159 | 552,390 | 371,045 | 666,045 |
| Virginia | 784,011 | 589,925 | 736,399 | 611,654 |
| Washington | 1,263,689 | 3,426,590 | 1,056,249 | 2,437,270 |
| West Virginia | 7,394,654 | 6,208,128 | 9,220,665 | 7,359,816 |
| Wyoming | 1,870,366 | 3,183,669 | 2,327,841 | 3,555,275 |
| Total product | 157,770,963 | 176,804,573 | 168,566,669 | 191,133,135 |

*Amount and value of coal produced in the United States, etc.*—Continued.

| State or Territory. | 1894. | | 1895. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Alabama | 4,397,178 | $4,085,535 | 5,693,775 | $5,126,822 |
| Arkansas | 512,626 | 631,988 | 598,322 | 751,156 |
| California | 67,247 | 155,620 | 75,453 | 175,778 |
| Colorado | 2,831,409 | 3,516,340 | 3,082,982 | 3,675,185 |
| Georgia | 354,111 | 299,290 | 260,998 | 215,863 |
| Illinois | 17,113,576 | 15,282,111 | 17,735,864 | 14,239,157 |
| Indiana | 3,423,921 | 3,295,034 | 3,995,892 | 3,642,623 |
| Indian Territory | 969,606 | 1,541,293 | 1,211,185 | 1,737,254 |
| Iowa | 3,967,253 | 4,997,939 | 4,156,074 | 4,982,102 |
| Kansas | 3,388,251 | 4,178,998 | 2,926,870 | 3,481,981 |
| Kentucky | 3,111,192 | 2,749,932 | 3,357,770 | 2,890,247 |
| Maryland | 3,501,428 | 2,687,270 | 3,915,585 | 3,160,592 |
| Michigan | 70,022 | 103,049 | 112,322 | 180,016 |
| Missouri | 2,245,039 | 2,634,564 | 2,372,393 | 2,651,612 |
| Montana | 927,395 | 1,887,390 | 1,504,193 | 2,850,906 |
| Nevada | 150 | 475 | ..... | ..... |
| New Mexico | 597,196 | 935,857 | 720,654 | 1,072,520 |
| North Carolina | 16,900 | 29,675 | 24,900 | 41,350 |
| North Dakota | 42,015 | 47,049 | *a* 39,197 | *a* 42,046 |
| Ohio | 11,909,856 | 9,841,723 | 13,355,806 | 10,618,477 |
| Oregon | 47,521 | 183,914 | 73,685 | 247,901 |
| Pennsylvania: | | | | |
| Anthracite | 51,921,121 | 78,488,063 | 57,999,337 | 82,019,272 |
| Bituminous | 39,912,463 | 29,479,820 | 50,217,228 | 35,980,357 |
| Tennessee | 2,180,879 | 2,119,481 | 2,535,644 | 2,349,032 |
| Texas | 420,848 | 976,458 | 484,959 | 913,138 |
| Utah | 431,550 | 603,479 | 471,836 | 617,349 |
| Virginia | 1,229,083 | 933,576 | 1,368,324 | 869,873 |
| Washington | 1,106,470 | 2,578,441 | 1,191,410 | 2,577,958 |
| West Virginia | 11,627,757 | 8,706,808 | 11,387,961 | 7,710,575 |
| Wyoming | 2,417,463 | 3,170,392 | 2,246,911 | 2,977,901 |
| Total product | 170,741,526 | 186,141,564 | 193,117,530 | 197,799,043 |

*a* Includes South Dakota.

*Amount and value of coal produced in the United States, etc.*—Continued.

| State or Territory. | 1896. | | 1897. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Alabama | 5,748,697 | $5,174,135 | 5,893,770 | $5,192,085 |
| Arkansas | 675,374 | 755,577 | 856,190 | 903,993 |
| California | *a* 93,776 | 220,523 | *a* 103,912 | 265,236 |
| Colorado | 3,112,400 | 3,606,642 | 3,361,703 | 3,947,186 |
| Georgia | *b* 246,359 | 179,770 | *b* 217,149 | 167,466 |
| Idaho | ..... | ..... | 645 | 2,150 |
| Illinois | 19,786,626 | 15,809,736 | 20,072,758 | 14,472,529 |
| Indiana | 3,905,779 | 3,261,737 | 4,151,169 | 3,472,348 |
| Indian Territory | 1,366,646 | 1,918,115 | 1,336,380 | 1,787,358 |
| Iowa | 3,954,028 | 4,628,022 | 4,611,865 | 5,219,503 |
| Kansas | 2,884,801 | 3,295,032 | 3,054,012 | 3,602,326 |
| Kentucky | 3,333,478 | 2,684,306 | 3,602,097 | 2,828,329 |
| Maryland | 4,143,936 | 3,299,928 | 4,442,128 | 3,363,996 |
| Michigan | 92,882 | 150,631 | 223,592 | 325,416 |
| Missouri | 2,331,542 | 2,518,194 | 2,665,626 | 2,887,884 |
| Montana | 1,543,445 | 2,279,672 | 1,647,882 | 2,897,408 |
| Nebraska | (*c*) | (*c*) | (*f*) | (*f*) |
| New Mexico | 622,626 | 930,381 | 716,981 | 991,611 |
| North Carolina | (*d*) | (*d*) | (*d*) | (*d*) |
| North Dakota | 78,050 | 84,908 | 77,246 | 83,803 |
| Ohio | 12,875,202 | 10,253,461 | 12,196,942 | 9,535,409 |
| Oregon | 101,721 | 294,564 | 101,755 | 313,890 |
| Pennsylvania: | | | | |
| Anthracite | 54,346,081 | 81,748,651 | 52,431,763 | 79,129,126 |
| Bituminous | 49,557,453 | 35,368,249 | 54,597,891 | 37,636,347 |
| Tennessee | 2,663,106 | 2,281,295 | 2,888,849 | 2,329,534 |
| Texas | 544,015 | 896,251 | 639,341 | 972,323 |
| Utah | 418,627 | 500,547 | 521,560 | 618,230 |
| Virginia | 1,254,723 | 848,851 | 1,528,302 | 1,021,918 |
| Washington | 1,195,504 | 2,396,078 | 1,434,112 | 2,777,687 |
| West Virginia | 12,876,296 | 8,336,685 | 14,248,159 | 8,987,393 |
| Wyoming | *e* 2,233,184 | 2,918,225 | 2,597,886 | 3,136,694 |
| Total product | 191,986,357 | 196,640,166 | 200,221,665 | 198,869,178 |

*a* Includes Alaska.
*b* Includes North Carolina.
*c* Included in Wyoming.
*d* Included in Georgia.
*e* Includes Nebraska.
*f* Included in Idaho.

Comparing the amount and value of the products in 1897 with that of 1896, the following statement of increases and decreases is obtained:

*Increases and decreases in coal production during 1897 compared with 1896, by States.*

| State or Territory. | Increase. | | Decrease. | |
|---|---|---|---|---|
| | Short tons. | Value. | Short tons. | Value. |
| Alabama | 145,073 | $17,950 | ..... | ..... |
| Arkansas | 180,816 | 148,416 | ..... | ..... |
| California | a 10,136 | 44,713 | ..... | ..... |
| Colorado | 249,303 | 340,544 | ..... | ..... |
| Georgia | ..... | ..... | 42,677 | $27,584 |
| Idaho | b 645 | 2,150 | ..... | ..... |
| Illinois | 286,132 | ..... | ..... | 1,337,207 |
| Indiana | 245,390 | 210,611 | ..... | ..... |
| Indian Territory | ..... | ..... | 30,266 | 130,757 |
| Iowa | 657,837 | 591,481 | ..... | ..... |
| Kansas | 169,211 | 307,294 | ..... | ..... |
| Kentucky | 268,619 | 144,023 | ..... | ..... |
| Maryland | 298,192 | 64,068 | ..... | ..... |
| Michigan | 130,710 | 174,785 | ..... | ..... |
| Missouri | 334,084 | 369,690 | ..... | ..... |
| Montana | 104,437 | 617,736 | ..... | ..... |
| New Mexico | 94,355 | 61,230 | ..... | ..... |
| North Carolina | 13,467 | 15,280 | ..... | ..... |
| North Dakota | ..... | ..... | 804 | 1,105 |
| Ohio | ..... | ..... | 678,260 | 718,052 |
| Oregon | 34 | 19,326 | ..... | ..... |
| Pennsylvania bituminous | 5,040,438 | 2,268,098 | ..... | ..... |
| Tennessee | 225,743 | 48,239 | ..... | ..... |
| Texas | 95,326 | 76,072 | ..... | ..... |
| Utah | 102,933 | 117,683 | ..... | ..... |
| Virginia | 273,579 | 173,067 | ..... | ..... |
| Washington | 238,608 | 381,609 | ..... | ..... |
| West Virginia | 1,371,863 | 650,708 | ..... | ..... |
| Wyoming | 364,702 | 218,469 | ..... | ..... |
| Total | 10,149,626 | 4,848,537 | ..... | ..... |
| Pennsylvania anthracite | ..... | ..... | 1,914,318 | 2,619,525 |
| Grand total | 8,235,308 | 2,229,012 | ..... | ..... |

a Includes Alaska.

b Includes Nebraska.

## LABOR STATISTICS.

The following table shows under one head the total number of employees in the coal mines of the United States for a period of eight years, and the average time made by each:

*Labor statistics of coal mining since 1890.*

| State or Territory. | 1890. | | 1891. | | 1892. | |
|---|---|---|---|---|---|---|
| | Number of days active. | Average number employed. | Number of days active. | Average number employed. | Number of days active. | Average number employed. |
| Alabama | 217 | 10,642 | 268 | 9,302 | 271 | 10,075 |
| Arkansas | 214 | 938 | 214 | 1,317 | 199 | 1,128 |
| California | 301 | 364 | 222 | 256 | 204 | 187 |
| Colorado | 220 | 5,827 | ..... | 6,000 | 229 | 5,747 |
| Georgia | 313 | 425 | 312 | 850 | 277 | 467 |
| Illinois | 204 | 28,574 | 215½ | 32,951 | 219½ | 34,585 |
| Indiana | 220 | 5,489 | 190 | 5,879 | 224 | 6,436 |
| Indian Territory | 238 | 2,571 | 221½ | 2,891 | 311 | 3,257 |
| Iowa | 213 | 8,130 | 224 | 8,124 | 236 | 8,170 |
| Kansas | 210 | 4,523 | 222 | 6,201 | 208½ | 6,559 |
| Kentucky | 219 | 5,259 | 225 | 6,355 | 217 | 6,724 |
| Maryland | 244 | 3,842 | 244 | 3,891 | 225 | 3,886 |
| Michigan | 229 | 180 | 205 | 223 | 195 | 230 |
| Missouri | 229 | 5,971 | 218 | 6,199 | 230 | 5,893 |
| Montana | 218 | 1,251 | ..... | 1,119 | 258 | 1,158 |
| Nevada | ..... | ..... | ..... | ..... | ..... | ..... |
| New Mexico | 192 | 827 | 265 | 806 | 223 | 1,083 |
| North Carolina | 200 | 80 | 254 | 80 | 160 | 90 |
| North Dakota | ..... | ..... | ..... | ..... | 216 | 54 |
| Ohio | 201 | 20,576 | 206 | 22,182 | 212 | 22,576 |
| Oregon | 305 | 208 | 125 | 100 | 120 | 90 |
| Pennsylvania bituminous | 232 | 61,333 | 223 | 63,661 | 223 | 66,655 |
| Tennessee | 263 | 5,082 | 230 | 5,097 | 240 | 4,926 |
| Texas | 241 | 674 | 225 | 787 | 208 | 871 |
| Utah | 289 | 429 | ..... | 621 | 230 | 646 |
| Virginia | 296 | 1,295 | 246 | 820 | 192 | 836 |
| Washington | 270 | 2,206 | 211 | 2,447 | 247 | 2,564 |
| West Virginia | 227 | 12,236 | 237 | 14,227 | 228 | 14,867 |
| Wyoming | 246 | 3,272 | ..... | 3,411 | 225 | 3,133 |
| Total | 226 | 192,204 | a 223 | 205,803 | 219 | 212,893 |
| Pennsylvania anthracite | 200 | 126,000 | 203 | 126,350 | 198 | 129,050 |
| Grand total | 216 | 318,204 | 215 | 332,153 | 212 | 341,943 |

a General average obtained from the average days made in the different States, exclusive of Colorado, Montana, Utah, and Wyoming.

*Labor statistics of coal mining since 1890*—Continued.

| State or Territory. | 1893. | | 1894. | |
|---|---|---|---|---|
| | Number of days active. | Average number employed. | Number of days active. | Average number employed. |
| Alabama | 237 | 11,294 | 238 | 10,859 |
| Arkansas | 151 | 1,559 | 134 | 1,493 |
| California | 208 | 158 | 232 | 125 |
| Colorado | 188 | 7,202 | 155 | 6,507 |
| Georgia | 342 | 736 | 304 | 729 |
| Illinois | 229 | 35,390 | 183 | 38,477 |
| Indiana | 201 | 7,644 | 149 | 8,603 |
| Indian Territory | 171 | 3,446 | 157 | 3,101 |
| Iowa | 204 | 8,863 | 170 | 9,995 |
| Kansas | 147 | 7,310 | 164 | 7,339 |
| Kentucky | 202 | 6,581 | 145 | 8,083 |
| Maryland | 240 | 3,935 | 215 | 3,974 |
| Michigan | 154 | 162 | 224 | 223 |
| Missouri | 206 | 7,375 | 138 | 7,523 |
| Montana | 242 | 1,401 | 192 | 1,782 |
| Nevada | ..... | ..... | 60 | 2 |
| New Mexico | 229 | 1,011 | 182 | 985 |
| North Carolina | 80 | 70 | 145 | 95 |
| North Dakota | 193 | 88 | 156 | 77 |
| Ohio | 188 | 23,931 | 136 | 27,105 |
| Oregon | 192 | 110 | 243 | 88 |
| Pennsylvania bituminous | 190 | 71,931 | 165 | 75,010 |
| Tennessee | 232 | 4,976 | 210 | 5,542 |
| Texas | 251 | 996 | 283 | 1,062 |
| Utah | 226 | 576 | 199 | 671 |
| Virginia | 253 | 961 | 234 | 1,635 |
| Washington | 241 | 2,757 | 207 | 2,662 |
| West Virginia | 219 | 16,524 | 186 | 17,824 |
| Wyoming | 189 | 3,378 | 190 | 3,032 |
| Total | 204 | 230,365 | 171 | 244,603 |
| Pennsylvania anthracite | 197 | 132,944 | 190 | 131,603 |
| Grand total | 201 | 363,309 | 178 | 376,206 |

*Labor statistics of coal mining since 1890*—Continued.

| State or Territory. | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|
| | Number of days active. | Average number employed. | Number of days active. | Average number employed. | Number of days active. | Average number employed. |
| Alabama | 244 | 10,346 | 248 | 9,894 | 233 | 10,597 |
| Arkansas | 176 | 1,218 | 168 | 1,507 | 161 | 1,990 |
| California | 262 | 190 | *a* 291 | 177 | *a* 156 | 381 |
| Colorado | 182 | 6,125 | 172 | 6,704 | 180 | 5,852 |
| Georgia | 312 | 848 | *b* 301 | 731 | *b* 296 | 520 |
| Idaho | ..... | ..... | ..... | ..... | *c* 91 | 7 |
| Illinois | 182 | 38,630 | 184 | 39,560 | 185 | 33,788 |
| Indiana | 189 | 8,530 | 163 | 8,806 | 176 | 8,886 |
| Indian Territory | 164 | 3,212 | 170 | 3,549 | 176 | 3,168 |
| Iowa | 189 | 10,066 | 178 | 9,672 | 201 | 10,703 |
| Kansas | 159 | 7,482 | 168 | 7,127 | 194 | 6,639 |
| Kentucky | 146 | 7,865 | 165 | 7,549 | 178 | 7,983 |
| Maryland | 248 | 3,912 | 204 | 4,039 | 262 | 4,719 |
| Michigan | 186 | 320 | 157 | 320 | 230 | 537 |
| Missouri | 163 | 6,299 | 168 | 5,982 | 191 | 6,414 |
| Montana | 223 | 2,184 | 234 | 2,335 | 252 | 2,337 |
| Nevada | ..... | ..... | ..... | ..... | ..... | ..... |
| New Mexico | 190 | 1,383 | 172 | 1,569 | 208 | 1,659 |
| North Carolina | 226 | 61 | ..... | ..... | ..... | ..... |
| North Dakota | 139 | 65 | 166 | 141 | 168 | 170 |
| Ohio | 176 | 24,644 | 161 | 25,500 | 148 | 26,410 |
| Oregon | 69 | 414 | 191 | 254 | 171 | 254 |
| Pennsylvania bituminous | 206 | 71,130 | 206 | 72,625 | 205 | 77,599 |
| Tennessee | 224 | 5,120 | 211 | 6,531 | 221 | 6,337 |
| Texas | 171 | 1,642 | 187 | 1,953 | 220 | 1,766 |
| Utah | 203 | 670 | 202 | 679 | 204 | 704 |
| Virginia | 225 | 2,158 | 198 | 2,510 | 213 | 2,344 |
| Washington | 224 | 2,840 | 221 | 2,622 | 236 | 2,739 |
| West Virginia | 195 | 19,159 | 201 | 19,078 | 205 | 20,504 |
| Wyoming | 184 | 3,449 | *c* 210 | 2,937 | 219 | 3,137 |
| Total | 194 | 239,962 | 192 | 244,171 | 196 | 248,144 |
| Pennsylvania anthracite | 196 | 142,917 | 174 | 148,991 | 150 | 149,557 |
| Grant total | 195 | 382,879 | 185 | 393,162 | 179 | 397,701 |

*a* Includes Alaska. *b* Includes North Carolina. *c* Includes Nebraska.

## PRICES.

The following table will be of interest as showing the fluctuations in the average prices ruling in each State since 1886. Prior to that year the statistics were not collected with sufficient accuracy to make a statement of the average prices of any practical value. These averages are obtained by dividing the total value by the total product, except for the years 1886, 1887, and 1888, when the item of colliery consumption was not considered.

*Average prices for coal at the mines since 1886.*

| State or Territory. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|---|
| Alabama | $1.43 | $1.30 | $1.15 | $1.11 | $1.03 | $1.07 |
| Arkansas | 1.60 | 1.68 | 1.50 | 1.42 | 1.29 | 1.19 |
| California | 3.00 | 3.00 | 4.00 | 2.36 | 2.56 | 2.20 |
| Colorado | 2.35 | 2.20 | 2.20 | 1.51 | 1.40 | 1.37 |
| Georgia | 1.50 | 1.50 | 1.50 | 1.50 | 1.04 | 1.50 |
| Illinois | 1.11 | 1.09 | 1.12 | .97 | .93 | .91 |
| Indiana | 1.15 | 1.34 | 1.40 | 1.02 | .99 | 1.03 |
| Indian Territory | 1.60 | 1.87 | 1.88 | 1.76 | 1.82 | 1.74 |
| Iowa | 1.25 | 1.34 | 1.30 | 1.33 | 1.24 | 1.27 |
| Kansas | 1.20 | 1.40 | 1.50 | 1.48 | 1.30 | 1.31 |
| Kentucky | 1.15 | 1.15 | 1.20 | .99 | .92 | .93 |
| Maryland | .95 | .95 | .95 | .86 | .86 | .81 |
| Michigan | 1.50 | 1.50 | 1.66 | 1.71 | 1.99 | 1.66 |
| Missouri | 1.30 | 1.34 | 2.21 | 1.36 | 1.24 | 1.23 |
| Montana | 3.50 | 3.50 | 3.50 | 2.42 | 2.42 | 2.27 |
| Nevada | ..... | ..... | ..... | ..... | ..... | ..... |
| New Mexico | 3.00 | 3.00 | 3.00 | 1.79 | 1.34 | 1.68 |
| North Carolina | ..... | ..... | ..... | ..... | 1.74 | 1.93 |
| North Dakota | 1.59 | 1.50 | 3.50 | 1.43 | 1.40 | 1.40 |
| Ohio | .95 | .88 | .93 | .93 | .94 | .94 |
| Oregon | 2.50 | 2.20 | 3.00 | ..... | 2.89 | 3.00 |
| Pennsylvania bituminous | .80 | .90 | .95 | .77 | .84 | .87 |
| Tennessee | 1.15 | 1.30 | 1.10 | 1.21 | 1.10 | 1.11 |
| Texas | 1.85 | 2.00 | 2.05 | 2.66 | 2.53 | 2.40 |
| Utah | 2.10 | 2.00 | 2.10 | 1.59 | 1.74 | 1.80 |
| Virginia | 1.00 | .94 | 1.00 | .93 | .75 | .83 |
| Washington | 2.25 | 2.20 | 3.00 | 2.32 | 2.71 | 2.31 |
| West Virginia | .94 | .95 | 1.10 | .82 | .84 | .80 |
| Wyoming | 3.00 | 3.00 | 3.00 | 1.26 | 1.70 | 1.53 |
| Total bituminous | a1.06 | a1.12 | a1.00 | 1.00 | .99 | .99 |
| Pennsylvania anthracite | a1.95 | a2.01 | a1.95 | 1.44 | 1.43 | 1.46 |
| General average | a1.30 | a1.45 | a1.42 | 1.13 | 1.12 | 1.13 |

a Exclusive of colliery consumption.

*Average prices for coal at the mines since 1886*—Continued.

| State or Territory. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| Alabama | $1.05 | $0.99 | $0.93 | $0.90 | $0.90 | $0.88 |
| Arkansas | 1.24 | 1.34 | 1.22 | 1.25 | 1.11 | 1.06 |
| California | 2.46 | 2.31 | 2.31 | 2.33 | *a* 2.35 | *a* 2.55 |
| Colorado | 1.62 | 1.24 | 1.24 | 1.20 | 1.16 | 1.17 |
| Georgia | .99 | .98 | .85 | .83 | .70 | .72 |
| Idaho | ..... | ..... | ..... | ..... | ..... | *b* 3.33 |
| Illinois | .91 | .89 | .89 | .80 | .80 | .72 |
| Indiana | 1.08 | 1.07 | .96 | .91 | .84 | .84 |
| Indian Territory | 1.71 | 1.79 | 1.59 | 1.43 | 1.40 | 1.34 |
| Iowa | 1.32 | 1.30 | 1.26 | 1.20 | 1.17 | 1.13 |
| Kansas | 1.31½ | 1.27 | 1.23 | 1.20 | 1.15 | 1.18 |
| Kentucky | .92 | .86 | .88 | .86 | .78 | .79 |
| Maryland | .89 | .88 | .77 | .81 | .80 | .76 |
| Michigan | 1.56 | 1.79 | 1.47 | 1.60 | 1.62 | 1.46 |
| Missouri | 1.23 | 1.23 | 1.17 | 1.12 | 1.08 | 1.08 |
| Montana | 2.36 | 1.99 | 2.04 | 1.89 | 1.47 | 1.76 |
| Nevada | ..... | ..... | 3.15 | ..... | ..... | ..... |
| New Mexico | 1.62 | 1.47 | 1.57 | 1.49 | 1.49 | 1.38 |
| North Carolina | 1.44 | 1.50 | 1.76 | 1.66 | 1.50 | 1.34 |
| North Dakota | .96 | 1.13 | 1.12 | 1.07 | 1.09 | 1.08 |
| Ohio | .94 | .92 | .83 | .79 | .79 | .78 |
| Oregon | 4.29 | 3.57 | 3.87 | 3.36 | 2.90 | 3.09 |
| Pennsylvania bituminous | .84 | .80 | .74 | .72 | .71 | .69 |
| Tennessee | 1.13 | 1.08 | .97 | .93 | .86 | .81 |
| Texas | 2.32 | 2.28 | 2.32 | 1.88 | 1.65 | 1.52 |
| Utah | 1.56 | 1.48 | 1.40 | 1.31 | 1.20 | 1.19 |
| Virginia | .86 | .84 | .76 | .63 | .68 | .67 |
| Washington | 2.28 | 2.31 | 2.33 | 2.16 | 2.00 | 1.94 |
| West Virginia | .80 | .77 | .75 | .68 | .65 | .63 |
| Wyoming | 1.27 | 1.35 | 1.31 | 1.33 | *b* 1.37 | 1.21 |
| Total bituminous | .99 | .96 | .91 | .86 | .83 | .81 |
| Pennsylvania anthracite | 1.57 | 1.59 | 1.52 | 1.41 | 1.50 | 1.51 |
| General average | 1.16 | 1.14 | 1.09 | 1.02 | 1.02 | .99 |

*a* Includes Alaska. *b* Includes Nebraska.

## IMPORTS AND EXPORTS.

The following tables have been compiled from official returns to the Bureau of Statistics of the Treasury Department, and show the imports and exports of coal from 1867 to 1897, inclusive. The values given in both cases are considerably higher than the average "spot" rates by which the values of the domestic production have been computed.

The tariff from 1824 to 1843 was 6 cents per bushel, or $1.68 per long ton; from 1843 to 1846, $1.75 per ton; 1846 to 1857, 30 per cent ad valorem; 1857 to 1861, 24 per cent ad valorem; 1861, bituminous and shale, $1 per ton; all other, 50 cents per ton; 1862 to 1864, bituminous and shale, $1.10 per ton; all other, 60 cents per ton; 1864 to 1872, bituminous and shale, $1.25 per ton; all other, 40 cents per ton. By the act of 1872 the tariff on bituminous coal and shale was made 75 cents per ton, and so continued until the act of August, 1894, changed it to 40 cents per ton. On slack or culm the tariff was made 40 cents per ton by the act of 1872; was changed to 30 cents per ton by the act of March, 1883, and so continued until the act of August, 1894, changed it to 15 cents per ton. The tariff act of 1897 provides that all coals containing less than 92 per cent fixed carbon, and which will pass over a half-inch screen, shall pay a duty of 67 cents per ton. Slack or culm was not changed by the act of 1897. Tons are all 2,240 pounds. Anthracite coal has been free of duty since 1870. During the period from June, 1854, to March, 1866, the reciprocity treaty was in force, and coal from the British Possessions in North America was admitted into the United States duty free.

The exports consist both of anthracite and bituminous coal, the amount of bituminous being the greater in the last few years. They are made principally by rail over the international bridges and by lake and sea to the Canadian Provinces. Exports are also made by sea to the West Indies, to Central and South America, and elsewhere.

The imports are principally from Australia and British Columbia to San Francisco, from Great Britain to the Atlantic and Pacific coasts, and from Nova Scotia to Atlantic coast points.

*Coal imported and entered for consumption in the United States, 1867 to 1897.*

| Year ended— | Anthracite. | | Bituminous and shale. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Long tons.* | | *Long tons.* | |
| June 30, 1867 | ..... | ..... | 509,802 | $1,412,597 |
| 1868 | ..... | ..... | 394,021 | 1,250,513 |
| 1869 | ..... | ..... | 437,228 | 1,222,119 |
| 1870 | ..... | ..... | 415,729 | 1,103,965 |
| 1871 | 973 | $4,177 | 430,508 | 1,121,914 |
| 1872 | 390 | 1,322 | 485,063 | 1,279,686 |
| 1873 | 2,221 | 10,764 | 460,028 | 1,548,208 |
| 1874 | 471 | 3,224 | 492,063 | 1,937,274 |
| 1875 | 138 | 963 | 436,714 | 1,791,601 |
| 1876 | 1,428 | 8,560 | 400,632 | 1,592,846 |
| 1877 | 630 | 2,220 | 495,816 | 1,782,941 |
| 1878 | 158 | 518 | 572,846 | 1,929,660 |
| 1879 | 488 | 721 | 486,501 | 1,716,209 |
| 1880 | 8 | 40 | 471,818 | 1,588,312 |
| 1881 | 1,207 | 2,628 | 652,963 | 1,988,199 |
| 1882 | 36 | 148 | 795,722 | 2,141,373 |
| 1883 | 507 | 1,172 | 645,924 | 3,013,555 |
| 1884 | 1,448 | 4,404 | 748,995 | 2,494,228 |
| 1885 | 4,976 | 15,848 | 768,477 | 2,548,432 |
| Dec. 31, 1886 | 2,039 | 4,920 | 811,657 | 2,501,153 |
| 1887 | 14,181 | 42,983 | 819,242 | 2,609,311 |
| 1888 | 24,093 | 68,710 | 1,085,647 | 3,728,060 |
| 1889 | 20,652 | 117,434 | 1,001,374 | 3,425,347 |
| 1890 | 15,145 | 46,695 | 819,971 | 2,822,216 |
| 1891 | 37,607 | 112,722 | 1,363,313 | 4,561,105 |
| 1892 | 65,058 | 197,583 | 1,143,304 | 3,744,862 |
| 1893 | 53,768 | 148,112 | *a* 1,082,993 | 3,623,892 |
| 1894 | 90,068 | 234,024 | *b* 1,242,714 | 3,785,513 |
| 1895 | 141,337 | 328,705 | *c* 1,212,023 | 3,626,623 |
| 1896 | 101,689 | 237,717 | 1,211,448 | 3,453,742 |
| 1897 | 24,534 | 59,222 | *d* 1,276,135 | 3,424,833 |

*a* Including 14,632 tons of slack or culm, valued at $16,906.
*b* Including 30,453 tons of slack or culm, valued at $32,267.
*c* Including 18,174 tons of slack or culm, valued at $15,309.
*d* Including 42,954 tons of slack or culm, valued at $44,962.

*Coal of domestic production exported from the United States, 1867 to 1897.*

| Year ended— | Anthracite. | | Bituminous and shale. | |
|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. |
| | *Long tons.* | | *Long tons.* | |
| June 30, 1867 | 192,912 | $1,333,457 | 92,189 | $512,742 |
| 1868 | 192,291 | 1,082,745 | 86,367 | 433,475 |
| 1869 | 283,783 | 1,553,115 | ..... | ..... |
| 1870 | 121,098 | 803,135 | 106,820 | 503,223 |
| 1871 | 134,571 | 805,169 | 133,380 | 564,067 |
| 1872 | 259,567 | 1,375,342 | 141,311 | 586,264 |
| 1873 | 342,180 | 1,827,822 | 242,453 | 1,086,253 |
| 1874 | 401,912 | 2,236,084 | 361,490 | 1,587,666 |
| 1875 | 316,157 | 1,791,626 | 203,189 | 828,943 |
| 1876 | 337,934 | 1,869,434 | 230,144 | 850,711 |
| 1877 | 418,791 | 1,891,351 | 321,665 | 1,024,711 |
| 1878 | 319,477 | 1,006,843 | 340,661 | 1,352,624 |
| 1879 | 386,916 | 1,427,886 | 276,000 | 891,512 |
| 1880 | 392,626 | 1,362.901 | 222,634 | 695,179 |
| 1881 | 462,208 | 2,091,928 | 191,038 | 739,532 |
| 1882 | 553,742 | 2,589,887 | 314,320 | 1,102,898 |
| 1883 | 557,813 | 2,648,033 | 463,051 | 1,593,214 |
| 1884 | 649,040 | 3,053,550 | 646,265 | 1,977,959 |
| 1885 | 588,461 | 2,586,421 | 683,481 | 1,989,541 |
| Dec. 31, 1886 | 667,076 | 2,718,143 | 544,768 | 1,440,631 |
| 1887 | 825,486 | 3,469,166 | 706,364 | 2,001,966 |
| 1888 | 969,542 | 4,325,126 | 860,462 | 2,529,472 |
| 1889 | 857,632 | 3,636,347 | 935,151 | 2,783,592 |
| 1890 | 794,335 | 3,272,697 | 1,280,930 | 4,004,995 |
| 1891 | 861,251 | 3,577,610 | 1,615,869 | 5,104,850 |
| 1892 | 851,639 | 3,722,903 | 1,645,869 | 4,999,289 |
| 1893 | 1,333,287 | 6,241,007 | 2,324,591 | 6,009,801 |
| 1894 | 1,440,625 | 6,359,021 | 2,195,716 | 4,970,270 |
| 1895 | 1,470,710 | 5,937,130 | 2,211,983 | 4,816,847 |
| 1896 | 1,350,000 | 5,925,506 | 2,276,202 | 5,072,818 |
| 1897 | 1,297,282 | 5,830,633 | 2,400,744 | 5,332,858 |

## WORLD'S PRODUCT OF COAL.

In the following table is given the coal product of the principal countries for the years nearest the one under review for which figures could be obtained. For the sake of convenience the amounts are expressed in the unit of measurement adopted in each country and reduced for comparison to short tons of 2,000 pounds. In each case the year is named for which the product is given.

*The world's product of coal.*

| Country. | Usual unit in producing country. | Equivalent in short tons. |
|---|---|---|
| Great Britain (1897) | long tons.. | 202,119,196 | 226,373,500 |
| United States (1897) | do.... | 178,769,344 | 200,221,665 |
| Germany (1897) | metric tons.. | 120,430,000 | 132,713,860 |
| France (1896) | do.... | 29,310,832 | 32,300,537 |
| Austria-Hungary (1896) | do.... | 33,678,000 | 37,113,156 |
| Belgium (1896) | do.... | 21,213,000 | 23,376,726 |
| Russia (1896) | do.... | 9,229,000 | 10,170,358 |
| Canada (1897) | short tons.. | 3,876,201 | 3,876,201 |
| Japan (1895) | metric tons.. | 4,849,000 | 5,343,598 |
| India (1896) | long tons.. | 3,848,000 | 4,309,760 |
| New South Wales (1897) | do.... | 4,383,591 | 4,909,622 |
| Spain (1897) | metric tons.. | 1,939,400 | 2,137,219 |
| New Zealand (1896) | long tons.. | 793,000 | 888,160 |
| Sweden (1896) | metric tons.. | 226,000 | 249,052 |
| Italy (1896) | do.... | 276,197 | 304,369 |
| South African Republic (1897) | long tons.. | 1,600,212 | 1,792,237 |
| Queensland (1896) | do.... | 371,000 | 415,520 |
| Victoria (1896) | do.... | 227,000 | 255,240 |
| Natal (1896) | do.... | 216,000 | 241,920 |
| Cape Colony (1896) | metric tons.. | 107,050 | 117,969 |
| Tasmania (1896) | do.... | 36,856 | 40,615 |
| Other countries (*a*) | long tons.. | 2,000,000 | 2,240,000 |
| Total | | | 689,391,284 |
| Percentage of the United States | | | 29 |

*a* Includes China, Turkey, Servia, Portugal, United States of Colombia, Chile, Borneo and Labuan, Mexico, Peru, Greece, etc.

In the following pages will be found a statement of the production of coal in the more important producing countries since 1868. This statement is interesting as showing the remarkable development of the industry in the United States. In 1868 this country produced only 14.35 per cent of the world's total. Great Britain's output was more than 3.6 times that of the United States, and more than half of the world's total. Germany's product was nearly 15 per cent more than that of this country and more than 15 per cent of the total output in the world. France produced nearly half as much as the United States.

The table shows that in 1897 this country produced 29 per cent of the world's total, while Great Britain's output was only 11½ per cent more than that of the United States. Great Britain's percentage of the total in 1897 was 33. Germany increased her percentage from 15 in 1868 to to 19 in 1897, but her total was only 66 per cent of that of the United States. The output of France was only 5 per cent of the total in 1897 and about one-sixth of that of the United States.

*World's production of coal, by countries, since 1868.*

| Year. | United States. | | Great Britain. | |
|---|---|---|---|---|
| | Long tons. | Short tons. | Long tons. | Short tons. |
| 1868 | 28,258,000 | 31,648,960 | 103,141,157 | 115,518,096 |
| 1869 | 28,268,000 | 31,660,160 | 107,427,557 | 120,318,864 |
| 1870 | 32,863,000 | 36,806,560 | 110,431,192 | 123,682,935 |
| 1871 | 41,384,000 | 46,350,080 | 117,352,028 | 131,434,271 |
| 1872 | 45,416,000 | 50,865,920 | 123,497,316 | 138,316,994 |
| 1873 | 51,004,000 | 57,124,480 | 128,680,131 | 144,121,747 |
| 1874 | 46,916,000 | 52,545,920 | 126,590,108 | 141,780,921 |
| 1875 | 46,686,000 | 52,288,320 | 133,306,485 | 149,303,263 |
| 1876 | 47,500,000 | 53,200,000 | 134,125,166 | 150,220,186 |
| 1877 | 53,948,000 | 60,421,760 | 134,179,968 | 150,281,564 |
| 1878 | 51,655,000 | 57,853,600 | 132,612,063 | 148,525,511 |
| 1879 | 59,333,000 | 66,452,960 | 133,720,393 | 149,766,840 |
| 1880 | 63,822,830 | 71,481,569 | 146,969,409 | 164,605,738 |
| 1881 | 76,865,357 | 85,881,030 | 154,184,300 | 172,686,416 |
| 1882 | 92,219,454 | 103,285,789 | 156,499,977 | 175,279,974 |
| 1883 | 102,867,969 | 115,212,125 | 163,737,327 | 183,385,806 |
| 1884 | 106,906,295 | 119,735,051 | 160,757,779 | 180,048,712 |
| 1885 | 99,069,216 | 110,957,522 | 159,351,418 | 178,473,588 |
| 1886 | 101,500,024 | 113,680,027 | 157,518,482 | 176,420,700 |
| 1887 | 116,651,974 | 130,650,211 | 162,119,812 | 181,574,189 |
| 1888 | 132,731,613 | 148,659,407 | 169,935,219 | 190,327,445 |
| 1889 | 126,097,869 | 141,229,613 | 176,916,724 | 198,146,731 |
| 1890 | 140,866,931 | 157,770,963 | 181,614,288 | 203,408,003 |
| 1891 | 150,505,954 | 168,566,668 | 185,479,126 | 207,736,621 |
| 1892 | 160,115,242 | 179,329,071 | 181,786,871 | 203,601,296 |
| 1893 | 162,814,977 | 182,352,774 | 164,325,795 | 184,044,890 |
| 1894 | 152,447,791 | 170,741,526 | 188,277,525 | 210,870,828 |
| 1895 | 172,426,366 | 193,117,530 | 189,661,362 | 212,320,725 |
| 1896 | 171,416,390 | 191,986,357 | 195,361,260 | 218,804,611 |
| 1897 | 178,769,344 | 200,221,665 | 202,119,196 | 226,373,500 |

*World's production of coal, by countries, since 1868*—Continued.

| Year. | Germany. | | France. | |
|---|---|---|---|---|
| | Metric tons. | Short tons. | Metric tons. | Short tons. |
| 1868 | 32,879,123 | 36,249,233 | 13,330,826 | 14,697,236 |
| 1869 | 34,343,913 | 37,864,164 | 13,509,745 | 14,894,494 |
| 1870 | 34,003,004 | 37,488,312 | 13,179,788 | 14,530,716 |
| 1871 | 37,856,110 | 41,736,361 | 13,240,135 | 14,597,249 |
| 1872 | 42,324,467 | 46,662,725 | 16,100,773 | 17,751,102 |
| 1873 | 46,145,194 | 50,875,076 | 17,479,341 | 19,270,973 |
| 1874 | 46,658,145 | 51,440,605 | 16,907,913 | 18,640,974 |
| 1875 | 47,804,054 | 52,703,970 | 16,956,840 | 18,694,916 |
| 1876 | 49,550,461 | 54,629,383 | 17,101,448 | 18,854,346 |
| 1877 | 48,229,882 | 53,173,445 | 16,804,529 | 18,526,993 |
| 1878 | 50,519,899 | 55,698,188 | 16,960,916 | 18,699,410 |
| 1879 | 53,470,716 | 58,951,464 | 17,110,979 | 18,864,854 |
| 1880 | 59,118,035 | 65,177,634 | 19,361,564 | 21,346,124 |
| 1881 | 61,540,485 | 67,848,385 | 19,765,983 | 21,791,996 |
| 1882 | 65,378,211 | 72,079,478 | 20,603,704 | 22,715,584 |
| 1883 | 70,442,648 | 77,663,019 | 21,333,884 | 23,520,607 |
| 1884 | 72,113,820 | 79,505,487 | 20,023,514 | 22,075,924 |
| 1885 | 73,675,515 | 81,227,255 | 19,510,530 | 21,510,359 |
| 1886 | 73,682,584 | 81,235,049 | 19,909,894 | 21,950,658 |
| 1887 | 76,232,618 | 84,046,461 | 21,287,589 | 23,469,567 |
| 1888 | 81,960,083 | 90,360,992 | 22,602,894 | 24,919,691 |
| 1889 | 84,788,609 | 93,479,441 | 24,303,509 | 26,794,619 |
| 1890 | 89,051,527 | 98,179,309 | 26,083,118 | 28,756,638 |
| 1891 | 94,252,278 | 103,913,136 | 26,024,893 | 28,692,444 |
| 1892 | 92,544,030 | 102,029,793 | 26,178,701 | 28,862,018 |
| 1893 | 95,426,153 | 105,207,334 | 25,650,981 | 28,280,207 |
| 1894 | 98,876,105 | 109,010,906 | 27,459,137 | 30,273,699 |
| 1895 | 103,876,813 | 114,524,186 | 28,020,000 | 30,878,040 |
| 1896 | 112,437,741 | 123,906,391 | 29,310,832 | 32,300,537 |
| 1897 | 120,430,000 | 132,713,860 | ..... | ..... |

*World's production of coal, by countries, since 1868*—Continued.

| Year. | Austria-Hungary. | | Belgium. | |
|---|---|---|---|---|
| | Metric tons. | Short tons. | Metric tons. | Short tons. |
| 1868 | 7,021,756 | 7,741,486 | 12,298,589 | 13,559,194 |
| 1869 | 7,663,043 | 8,448,505 | 12,943,994 | 14,270,753 |
| 1870 | 8,355,945 | 9,212,429 | 13,697,118 | 15,101,073 |
| 1871 | 8,437,401 | 9,302,235 | 13,733,176 | 15,140,827 |
| 1872 | 8,825,896 | 9,730,550 | 15,658,948 | 17,263,990 |
| 1873 | 10,104,769 | 11,140,508 | 15,778,401 | 17,395,687 |
| 1874 | 12,631,364 | 13,926,079 | 14,669,029 | 16,172,604 |
| 1875 | 13,062,738 | 14,395,137 | 15,011,331 | 16,549,992 |
| 1876 | 13,000,000 | 14,327,300 | 14,329,578 | 15,798,360 |
| 1877 | 13,500,000 | 14,883,750 | 13,669,077 | 15,070,157 |
| 1878 | 13,900,000 | 15,324,750 | 14,899,175 | 16,426,340 |
| 1879 | 14,500,000 | 15,986,250 | 15,447,292 | 17,030,640 |
| 1880 | 14,800,000 | 16,317,000 | 16,886,698 | 18,617,585 |
| 1881 | 15,304,813 | 16,873,556 | 16,873,951 | 18,603,531 |
| 1882 | 15,555,292 | 17,149,709 | 17,590,989 | 19,394,065 |
| 1883 | 17,047,961 | 18,795,377 | 18,177,754 | 20,040,974 |
| 1884 | 18,000,000 | 19,845,000 | 18,051,499 | 19,901,778 |
| 1885 | 20,435,463 | 22,530,098 | 17,437,603 | 19,224,957 |
| 1886 | 20,779,441 | 22,909,334 | 17,285,543 | 19,057,311 |
| 1887 | 21,879,172 | 24,121,787 | 18,378,624 | 20,262,433 |
| 1888 | 23,859,608 | 26,305,218 | 19,218,481 | 21,188,375 |
| 1889 | 25,328,417 | 27,924,580 | 19,869,980 | 21,906,653 |
| 1890 | 27,504,032 | 30,323,195 | 20,365,960 | 22,453,471 |
| 1891 | 28,823,240 | 31,777,622 | 19,675,644 | 21,692,398 |
| 1892 | 29,037,978 | 32,014,371 | 19,583,173 | 21,590,448 |
| 1893 | 30,449,304 | 33,570,358 | 19,410,519 | 21,400,097 |
| 1894 | 31,492,000 | 34,704,184 | 20,458,827 | 22,555,857 |
| 1895 | 32,654,777 | 35,985,564 | 20,414,849 | 22,507,371 |
| 1896 | 33,678,000 | 37,113,156 | 21,213,000 | 23,376,726 |
| 1897 | ..... | ..... | ..... | ..... |

*World's production of coal, by countries, since 1868*—Continued.

| Year. | Russia. | | Japan. | |
|---|---|---|---|---|
| | Metric tons. | Short tons. | Metric tons. | Short tons. |
| 1868 | ..... | ..... | ..... | ..... |
| 1869 | ..... | ..... | ..... | ..... |
| 1870 | 696, 673 | 768, 082 | ..... | ..... |
| 1871 | ..... | ..... | ..... | ..... |
| 1872 | ..... | ..... | ..... | ..... |
| 1873 | ..... | ..... | ..... | ..... |
| 1874 | ..... | ..... | ..... | ..... |
| 1875 | 1, 709, 718 | 1, 884, 964 | ..... | ..... |
| 1876 | ..... | ..... | ..... | ..... |
| 1877 | ..... | ..... | ..... | ..... |
| 1878 | 2, 483, 575 | 2, 738, 141 | ..... | ..... |
| 1879 | 2, 874, 790 | 3, 169, 456 | ..... | ..... |
| 1880 | 3, 238, 470 | 3, 570, 413 | ..... | ..... |
| 1881 | 3, 439, 787 | 3, 792, 365 | ..... | ..... |
| 1882 | 3, 672, 782 | 4, 049, 242 | ..... | ..... |
| 1883 | 3, 916, 105 | 4, 317, 506 | 1, 021, 000 | 1, 125, 142 |
| 1884 | 3, 869, 689 | 4, 266, 332 | 1, 159, 000 | 1, 277, 218 |
| 1885 | 4, 207, 905 | 4, 639, 215 | 1, 314, 000 | 1, 448, 028 |
| 1886 | 4, 506, 027 | 4, 967, 895 | 1, 402, 000 | 1, 545, 004 |
| 1887 | 4, 464, 174 | 4, 921, 752 | 1, 785, 000 | 1, 967, 070 |
| 1888 | 5, 187, 312 | 5, 719, 011 | 2, 044, 000 | 2, 252, 488 |
| 1889 | 6, 215, 577 | 6, 852, 674 | 2, 435, 000 | 2, 683, 370 |
| 1890 | 6, 016, 525 | 6, 633, 219 | 2, 653. 000 | 2, 923, 606 |
| 1891 | 6, 233, 020 | 6, 871, 905 | 3, 230, 000 | 3, 559, 460 |
| 1892 | 6, 816, 323 | 7, 514, 996 | 3, 228, 000 | 3, 557, 256 |
| 1893 | 7, 535, 000 | 8, 307, 337 | 3, 350, 000 | 3, 691, 700 |
| 1894 | 8, 629, 000 | 9, 509, 158 | 4, 311, 000 | 4, 750, 722 |
| 1895 | 9, 079, 138 | 10, 005, 210 | 4, 849, 000 | 5, 343, 598 |
| 1896 | 9, 229, 000 | 10, 170, 358 | ..... | ..... |
| 1897 | ..... | ..... | ..... | ..... |

*World's production of coal, by countries, since 1868*—Continued.

| Year. | Other countries. | Total. | Per cent of United States. |
|---|---|---|---|
| | Short tons. | Short tons. | |
| 1868 | 1,152,665 | 220,566,870 | 14.35 |
| 1869 | 1,107,395 | 228,564,335 | 13.85 |
| 1870 | 1,086,717 | 238,676,824 | 15.42 |
| 1871 | 1,128,822 | 259,689,845 | 17.85 |
| 1872 | 1,293,835 | 281,885,116 | 18.04 |
| 1873 | 1,514,191 | 301,442,662 | 18.95 |
| 1874 | 2,697,160 | 297,204,263 | 17.68 |
| 1875 | 2,638,491 | 308,459,053 | 16.95 |
| 1876 | 2,601,761 | 309,631,336 | 17.18 |
| 1877 | 2,823,109 | 315,180,778 | 19.17 |
| 1878 | 3,176,050 | 318,441,990 | 18.17 |
| 1879 | 3,362,605 | 333,585,069 | 19.92 |
| 1880 | 3,621,342 | 364,737,405 | 19.60 |
| 1881 | 5,185,974 | 392,663,253 | 21.87 |
| 1882 | 6,128,631 | 420,082,472 | 24.58 |
| 1883 | 6,930,279 | 450,990,835 | 25.55 |
| 1884 | 7,367,309 | 454,022,811 | 26.37 |
| 1885 | 7,570,507 | 447,581,529 | 24.79 |
| 1886 | 9,058,136 | 450,824,114 | 25.22 |
| 1887 | *a* 10,338,437 | 481,351,907 | 27.14 |
| 1888 | 11,548,758 | 521,281,385 | 28.52 |
| 1889 | 12,679,474 | 531,697,155 | 26.56 |
| 1890 | 13,058,616 | 563,507,020 | 28.00 |
| 1891 | 14,789,656 | 587,599,910 | 28.69 |
| 1892 | 15,003,435 | 593,502,684 | 30.22 |
| 1893 | 15,201,842 | 582,056,539 | 31.33 |
| 1894 | *b* 18,254,353 | 610,671,233 | 27.96 |
| 1895 | *c* 19,462,803 | 644,145,027 | 29.98 |
| 1896 | *d* 20,864,266 | 663,866,000 | 28.92 |
| 1897 | ..... | ..... | ..... |

*a* From 1887 to 1893, inclusive, the total includes, in addition to the countries named on the following pages, the estimated output of countries not specified. The amounts added for this factor each year are as follows: 1887, 500,000 tons; 1888, 700,000 tons; 1889, 900,000 tons; 1890, 1,000,000 tons; 1891, 1,000,000 tons; 1892, 1,400,000 tons; 1893, 1,500,000 tons.

*b* This includes, in addition to the countries named on the following pages, the output of Natal, 169,702 tons; Cape Colony, 78,053 tons; Tasmania, 34,633 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,522,388 tons.

*c* This includes, in addition to the countries named on the following pages, the output of Natal, 172,425 tons; Cape Colony, 98,543 tons; Tasmania, 41,279 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,552,247 tons.

*d* This includes, in addition to the countries named on the following pages, the output of Natal, 241,920 tons; Cape Colony, 117,969 tons; Tasmania, 40,615 tons; China, Turkey, Servia, Portugal, etc. (estimated), 2,240,000 tons. Total, 2,640,504 tons.

*Product of minor coal-producing countries since 1868.*

| Year. | New South Wales. | | Queensland. | |
|---|---|---|---|---|
| | Long tons. | Short tons. | Long tons. | Short tons. |
| 1868 | 954,231 | 1,068,739 | 19,611 | 21,964 |
| 1869 | 919,774 | 1,030,147 | 11,120 | 12,454 |
| 1870 | 868,564 | 972,791 | 22,639 | 25,356 |
| 1871 | 898,784 | 1,006,638 | 17,000 | 19,040 |
| 1872 | 1,012,426 | 1,133,917 | 27,727 | 31,054 |
| 1873 | 1,192,862 | 1,336,005 | 33,613 | 37,647 |
| 1874 | 1,304,567 | 1,461,115 | 43,443 | 48,656 |
| 1875 | 1,329,729 | 1,489,296 | 32,107 | 35,960 |
| 1876 | 1,319,918 | 1,478,308 | 50,627 | 56,702 |
| 1877 | 1,444,271 | 1,617,584 | 60,918 | 68,228 |
| 1878 | 1,575,497 | 1,764,556 | 52,580 | 58,890 |
| 1879 | 1,583,381 | 1,773,387 | 55,012 | 61,613 |
| 1880 | 1,466,180 | 1,642,122 | 58,052 | 65,018 |
| 1881 | 1,769,597 | 1,981,949 | 65,612 | 73,485 |
| 1882 | 2,109,282 | 2,362,396 | 74,436 | 83,368 |
| 1883 | 2,521,457 | 2,824,032 | 104,750 | 117,320 |
| 1884 | 2,749,109 | 3,079,002 | 120,727 | 135,214 |
| 1885 | 2,878,863 | 3,224,327 | 209,698 | 234,862 |
| 1886 | 2,830,175 | 3,169,796 | 228,656 | 256,094 |
| 1887 | 2,922,497 | 3,273,197 | 238,813 | 267,470 |
| 1888 | 3,203,444 | 3,587,857 | 311,412 | 348,781 |
| 1889 | 3,655,632 | 4,094,308 | 265,507 | 297,368 |
| 1890 | 3,060,876 | 3,428,181 | 338,344 | 378,945 |
| 1891 | 4,037,929 | 4,522,480 | 271,603 | 304,195 |
| 1892 | 3,780,968 | 4,234,684 | 265,086 | 296,896 |
| 1893 | 3,278,328 | 3,671,727 | 264,403 | 296,131 |
| 1894 | 3,672,076 | 4,112,725 | 270,705 | 303,190 |
| 1895 | 3,737,536 | 4,186,040 | 322,977 | 361,734 |
| 1896 | 3,909,517 | 4,378,659 | 371,000 | 415,520 |
| 1897 | 4,383,591 | 4,909,622 | ..... | ..... |

*Product of minor coal-producing countries since 1868*—Continued.

| Year. | New Zealand. | | Victoria. | | Canada. |
|---|---|---|---|---|---|
| | Long tons. | Short tons. | Long tons. | Short tons. | Short tons. |
| 1868 | | | | | |
| 1869 | | | | | |
| 1870 | | | | | |
| 1871 | | | | | |
| 1872 | | | | | |
| 1873 | | | | | |
| 1874 | | | | | 1,058,446 |
| 1875 | | | | | 984,905 |
| 1876 | | | | | 933,803 |
| 1877 | | | | | 1,002,395 |
| 1878 | 162,218 | 181,684 | | | 1,034,081 |
| 1879 | 231,218 | 258,964 | | | 1,123,863 |
| 1880 | 299,923 | 335,913 | | | 1,424,635 |
| 1881 | 337,262 | 377,733 | | | 1,487,182 |
| 1882 | 378,272 | 423,665 | | | 1,811,708 |
| 1883 | 421,764 | 472,376 | | | 1,806,259 |
| 1884 | 480,831 | 538,531 | | | 1,950,080 |
| 1885 | 511,063 | 572,390 | | | 1,879,470 |
| 1886 | 534,353 | 598,475 | | | 2,091,976 |
| 1887 | 558,620 | 625,654 | | | 2,418,494 |
| 1888 | 613,895 | 687,562 | | | 2,658,134 |
| 1889 | 586,445 | 656,818 | 14,421 | 16,152 | 2,719,478 |
| 1890 | 637,397 | 713,885 | 20,750 | 23,240 | 3,117,661 |
| 1891 | 668,794 | 749,049 | 22,834 | 25,574 | 3,623,076 |
| 1892 | 673,315 | 754,113 | 23,363 | 26,166 | 3,292,547 |
| 1893 | 691,548 | 774,534 | 91,726 | 102,733 | 3,201,742 |
| 1894 | 719,546 | 805,892 | 175,175 | 196,196 | 3,903,913 |
| 1895 | 727,000 | 814,240 | 194,171 | 217,472 | 3,512,504 |
| 1896 | 793,000 | 888,160 | 227,000 | 255,240 | 3,743,234 |
| 1897 | | | | | |

*Product of minor coal-producing countries since 1868*—Continued.

| Year. | India. | | Spain. | |
|---|---|---|---|---|
| | Long tons. | Short tons. | Metric tons. | Short tons. |
| 1868 | ..... | ..... | ..... | ..... |
| 1869 | ..... | ..... | ..... | ..... |
| 1870 | ..... | ..... | ..... | ..... |
| 1871 | ..... | ..... | ..... | ..... |
| 1872 | ..... | ..... | ..... | ..... |
| 1873 | ..... | ..... | ..... | ..... |
| 1874 | ..... | ..... | ..... | ..... |
| 1875 | ..... | ..... | ..... | ..... |
| 1876 | ..... | ..... | ..... | ..... |
| 1877 | ..... | ..... | ..... | ..... |
| 1878 | ..... | ..... | ..... | ..... |
| 1879 | ..... | ..... | ..... | ..... |
| 1880 | ..... | ..... | ..... | ..... |
| 1881 | 997,543 | 1,117,248 | ..... | ..... |
| 1882 | 1,130,242 | 1,265,871 | ..... | ..... |
| 1883 | 1,315,976 | 1,473,893 | ..... | ..... |
| 1884 | 1,266,312 | 1,418,269 | ..... | ..... |
| 1885 | 1,294,221 | 1,449,528 | ..... | ..... |
| 1886 | 1,401,295 | 1,569,450 | 1,001,432 | 1,104,079 |
| 1887 | 1,560,393 | 1,747,640 | 1,038,305 | 1,144,731 |
| 1888 | 1,802,876 | 2,019,221 | 1,036,565 | 1,142,813 |
| 1889 | 2,045,359 | 2,290,802 | 1,153,755 | 1,272,015 |
| 1890 | 2,168,521 | 2,438,744 | 1,212,089 | 1,336,328 |
| 1891 | 2,328,577 | 2,608,006 | 1,287,988 | 1,420,007 |
| 1892 | 2,537,696 | 2,842,220 | 1,461,196 | 1,610,969 |
| 1893 | 2,529,855 | 2,833,438 | 1,484,794 | 1,636,986 |
| 1894 | 2,810,929 | 3,158,240 | 1,657,010 | 1,830,853 |
| 1895 | 3,538,000 | 3,962,560 | 1,783,783 | 1,965,729 |
| 1896 | 3,848,000 | 4,309,760 | 1,878,399 | 2,069,996 |
| 1897 | ..... | ..... | 1,939,400 | 2,137,219 |

*Product of minor coal-producing countries since 1868*—Continued.

| Year. | Italy. | | Sweden. | | South African Republic. | |
|---|---|---|---|---|---|---|
| | Metric tons. | Short tons. | Metric tons. | Short tons. | Long tons. | Short tons. |
| 1868 | 56,201 | 61,962 | ..... | ..... | ..... | ..... |
| 1869 | 58,770 | 64,794 | ..... | ..... | ..... | ..... |
| 1870 | 80,336 | 88,570 | ..... | ..... | ..... | ..... |
| 1871 | 93,555 | 103,144 | ..... | ..... | ..... | ..... |
| 1872 | 116,884 | 128,864 | ..... | ..... | ..... | ..... |
| 1873 | 127,473 | 140,539 | ..... | ..... | ..... | ..... |
| 1874 | 116,955 | 128,943 | ..... | ..... | ..... | ..... |
| 1875 | 116,399 | 128,330 | ..... | ..... | ..... | ..... |
| 1876 | 120,588 | 132,948 | ..... | ..... | ..... | ..... |
| 1877 | 122,360 | 134,902 | ..... | ..... | ..... | ..... |
| 1878 | 124,117 | 136,839 | ..... | ..... | ..... | ..... |
| 1879 | 131,318 | 144,778 | ..... | ..... | ..... | ..... |
| 1880 | 139,369 | 153,654 | ..... | ..... | ..... | ..... |
| 1881 | 134,582 | 148,377 | ..... | ..... | ..... | ..... |
| 1882 | 164,737 | 181,623 | ..... | ..... | ..... | ..... |
| 1883 | 214,421 | 236,399 | ..... | ..... | ..... | ..... |
| 1884 | 223,322 | 246,213 | ..... | ..... | ..... | ..... |
| 1885 | 190,413 | 209,930 | ..... | ..... | ..... | ..... |
| 1886 | 243,325 | 268,266 | ..... | ..... | ..... | ..... |
| 1887 | 327,665 | 361,251 | ..... | ..... | ..... | ..... |
| 1888 | 366,794 | 404,390 | ..... | ..... | ..... | ..... |
| 1889 | 390,320 | 432,533 | ..... | ..... | ..... | ..... |
| 1890 | 376,326 | 415,500 | 187,512 | 206,132 | ..... | ..... |
| 1891 | 289,286 | 318,938 | 198,033 | 218,331 | ..... | ..... |
| 1892 | 295,713 | 326,024 | 199,380 | 219,816 | ..... | ..... |
| 1893 | 317,249 | 349,767 | 199,933 | 220,426 | 548,534 | 614,358 |
| 1894 | 271,295 | 299,103 | 213,633 | 235,532 | 791,358 | 886,321 |
| 1895 | 305,321 | 336,563 | 223,652 | 246,464 | 1,133,466 | 1,269,482 |
| 1896 | 276,197 | 304,369 | 226,000 | 249,052 | 1,437,297 | 1,609,772 |
| 1897 | ..... | ..... | ..... | ..... | 1,600,212 | 1,792,237 |

## MACHINE-MINED BITUMINOUS COAL.

In Mineral Resources for 1896 some statistics were presented which exhibited the development of the use of mining machines in the bituminous coal mines of the United States during a period of six years. The investigation was continued in collecting the statistics of production in 1897, with the results shown in the following table. The report for 1896 covered fifteen States, and, while incomplete, was sufficiently accurate to serve the purpose. It did not include, for instance, the statistics of machine mining in Illinois, which are included in the present report, and which show that the total amount of coal mined by

machines in 1891 was somewhat more than double the amount stated in the previous report, and that the percentage of the machine-mined coal to the total product in that year was 5.49 instead of 3.27.

The reports for 1897 show that mining machines were in use in twenty States in 1897, as compared with sixteen in 1896, and eight in 1891. Utah and Washington, which had a machine-mined tonnage of 760 and 3,020, respectively, in 1896, did not report any product so won in 1897; while six States which did not report any coal won by machines in 1891 or 1896 had a combined machine-mined product of nearly 2,000,000 short tons in 1897. These States, with the amounts of coal extracted by machines, were as follows: Alabama, 294,384 short tons; Kansas, 4,500 short tons; Kentucky, 1,299,436 short tons; Tennessee, 47,207 short tons; Texas, 11,750 short tons; and Virginia, 323,649 short tons.

The number of firms using machines has increased from 51 in 1891 to 136 in 1896 and 211 in 1897. The number of machines in use has increased from 545 in 1891 to 1,446 in 1896 and 1,988 in 1897. The amount of coal won by machines has increased from 6,211,732 short tons in 1891 to 16,424,932 in 1896 and 22,649,220 short tons in 1897. The most significant increase shown by these statistics, however, is in the percentage of machine-mined coal to the total product. In 1891 the proportion of the total product won by machines was 5.49 per cent, in 1896 12.41 per cent, and in 1897 15.95 per cent, nearly 3 times the percentage won in 1891. These increases are rendered all the more significant when the total tonnage in the States included in this tabulation is considered in comparison with the machine-mined product. The total product of the twenty-two States included in the following table in 1891 was 113,199,882 short tons; in 1897 the product of the same States was 141,993,577 short tons; showing an increase of 28,793,695 short tons, or 25 per cent. The product won by machines has increased from 6,211,732 short tons to 22,649,220 short tons, a gain of 16,437,488 short tons, or 265 per cent. The total bituminous product of the United States from 1891 to 1897 increased 25 per cent, or 29,888,665 short tons, of which 16,437,488 short tons, or 14 per cent, was represented by the increase in machine-mined coal.

With the exception of Utah and Washington, every State in the following table had a larger product from machines in 1897 than in 1896, and in only two other cases, Indiana and Missouri, was the ratio of machine product to the total less in 1897 than in 1896.

Practically all of the coal mined in Alaska is extracted by machines, giving that Territory a percentage of 100. Montana's machine-mined coal was 43.77 per cent of the total in 1897 against 37.54 per cent in 1896. Of Kentucky's product in 1897, 36.07 per cent was mined by machines. These two States represent the most important development in machine mining as compared to the total production. Pennsylvania, the largest producer, has also the largest machine tonnage, but the latter was only 12.29 per cent of the total product of the State in 1896, and 16.35 per cent in 1897. Illinois comes second both in total output and machine product, the latter being a little over 19½ per cent.

of the total output of the State in each year. Ohio, fourth in production, is third in the amount of coal mined by machines, her machine-won product in 1897 being within 3 per cent of that of Illinois. West Virginia, the third State in amount of production, has a comparatively unimportant machine product. Kentucky ranks eighth in amount of product and fourth in machine tonnage; Indiana ranks seventh and fifth, respectively; Montana, fourteenth and sixth; and Wyoming, thirteenth and seventh. These are the only States whose production by the use of machines exceeded 500,000 short tons in 1897.

The remarkable increase in the production of coal by the use of machines, superseding a large amount of manual labor and cheapening the cost of production, has undoubtedly had an important bearing on the prices of bituminous coal, which, as shown elsewhere, have declined steadily for several years. In some cases selling prices have been lowered on account of the lessened cost of production; in other cases machines have been introduced in order to meet reduced prices caused by an already glutted market. In nearly all cases the benefit that might have been derived from the introduction of machines has been sacrificed in the effort to increase tonnage rather than to continue previous output with a shortened pay roll.

The statistics of the production of coal by machines in 1891, 1896, and 1897 are shown in the following table:

*Bituminous coal mined by machines in twenty-two States in 1891, 1896, and 1897.*

| State. | Number of firms using machines. | | | Number of machines in use. | | | Number of tons mined by machines. | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1891. | 1896. | 1897. | 1891. | 1896. | 1897. | 1891. | 1896. | 1897. |
| Alabama | ..... | ..... | 3 | ..... | ..... | 45 | ..... | ..... | 294,384 |
| Alaska | ..... | 1 | 1 | ..... | 6 | 6 | ..... | 15,232 | 17,920 |
| Arkansas | ..... | 1 | 1 | ..... | 14 | 15 | ..... | 21,094 | 87,532 |
| Colorado | 1 | 6 | 8 | 20 | 34 | 37 | 284,646 | 318,172 | 352,400 |
| Illinois | 16 | 21 | 35 | 241 | 307 | 320 | 3,027,305 | 3,871,410 | 3,946,257 |
| Indiana | 3 | 11 | 11 | 47 | 186 | 174 | 212,830 | 964,378 | 1,023,361 |
| Indian Territory | ..... | 3 | 3 | ..... | 56 | 54 | ..... | 191,585 | 263,811 |
| Iowa | 2 | 5 | 7 | 9 | 45 | 67 | 41,540 | 84,556 | 181,209 |
| Kansas | ..... | ..... | 1 | ..... | ..... | 1 | ..... | ..... | 4,500 |
| Kentucky | ..... | ..... | 13 | ..... | ..... | 162 | ..... | ..... | 1,299,436 |
| Missouri | ..... | 1 | 1 | ..... | 4 | 3 | ..... | 47,827 | 59,692 |
| Montana | ..... | 3 | 2 | ..... | 62 | 61 | ..... | 579,414 | 720,345 |
| North Dakota | ..... | 1 | 1 | ..... | 1 | 2 | ..... | 15,000 | 20,000 |
| Ohio | 19 | 31 | 39 | 114 | 209 | 224 | 1,654,081 | 3,368,349 | 3,843,345 |
| Pennsylvania | 7 | 41 | 64 | 72 | 454 | 690 | 431,440 | 6,092,644 | 8,925,293 |
| Tennessee | ..... | ..... | 2 | ..... | ..... | 8 | ..... | ..... | 47,207 |
| Texas | ..... | ..... | 1 | ..... | ..... | 5 | ..... | ..... | 11,750 |
| Utah | ..... | 1 | ..... | ..... | 1 | ..... | ..... | 760 | ..... |
| Virginia | ..... | ..... | 1 | ..... | ..... | 22 | ..... | ..... | 323,649 |
| Washington | ..... | 1 | ..... | ..... | 3 | ..... | ..... | 3,920 | ..... |
| West Virginia | 1 | 7 | 13 | 8 | 25 | 47 | 205,784 | 430,944 | 673,523 |
| Wyoming | 2 | 2 | 4 | 34 | 39 | 45 | 354,106 | 419,647 | 555,526 |
| Total | 51 | 136 | 211 | 545 | 1,446 | 1,988 | 6,211,732 | 16,424,932 | 22,649,220 |

*Bituminous coal mined by machines in twenty-two States in 1891, 1896, and 1897*—Cont'd.

| State. | Total tonnage. | | | Percentage of total product mined by machines. | | |
|---|---|---|---|---|---|---|
| | 1891. | 1896. | 1897. | 1891. | 1896. | 1897. |
| Alabama | 4,759,781 | 5,748,697 | 5,893,770 | ..... | ..... | 4.99 |
| Alaska | ..... | 15,232 | 17,920 | ..... | 100.00 | 100.00 |
| Arkansas | 542,379 | 675,374 | 850,190 | ..... | 3.12 | 10.30 |
| Colorado | 3,512,632 | 3,112,400 | 3,361,703 | 8.10 | 10.22 | 10.48 |
| Illinois | 15,660,698 | 19,786,626 | 20,072,758 | 19.33 | 19.57 | 19.66 |
| Indiana | 2,973,474 | 3,905,779 | 4,151,169 | 7.16 | 24.69 | 24.65 |
| Indian Territory | 1,091,032 | 1,366,646 | 1,336,380 | ..... | 14.02 | 19.74 |
| Iowa | 3,825,495 | 3,954,028 | 4,611,865 | 1.09 | 2.14 | 3.93 |
| Kansas | 2,716,705 | 2,884,801 | 3,054,012 | ..... | ..... | 0.15 |
| Kentucky | 2,916,069 | 3,333,478 | 3,602,097 | ..... | ..... | 36.07 |
| Missouri | 2,674,606 | 2,331,542 | 2,665,626 | ..... | 2.56 | 2.24 |
| Montana | 541,861 | 1,543,445 | 1,645,799 | ..... | 37.54 | 43.77 |
| North Dakota | 30,000 | 78,050 | 77,246 | ..... | 19.22 | 25.89 |
| Ohio | 12,868,683 | 12,875,202 | 12,196,942 | 12.85 | 26.16 | 31.51 |
| Pennsylvania | 42,788,490 | 49,557,453 | 54,597,891 | 1.01 | 12.20 | 16.35 |
| Tennessee | 2,413,678 | 2,663,106 | 2,888,849 | ..... | ..... | 1.63 |
| Texas | 172,109 | 544,015 | 639,341 | ..... | ..... | 1.84 |
| Utah | 371,045 | 418,627 | 521,560 | ..... | 0.18 | ..... |
| Virginia | 736,399 | 1,254,723 | 1,528,302 | ..... | ..... | 21.18 |
| Washington | 1,056,249 | 1,195,504 | 1,434,112 | ..... | 0.33 | ..... |
| West Virginia | 9,220,665 | 12,876,296 | 14,248,159 | 2.23 | 3.35 | 4.73 |
| Wyoming | 2,327,841 | 2,229,634 | 2,597,886 | 15.21 | 18.82 | 21.38 |
| Total | 113,199,882 | 132,350,648 | 141,993,577 | 5.49 | 12.41 | 15.95 |

In addition to the inquiries addressed to the producers regarding the statistics of coal mined by machines, letters of similar nature were sent to the manufacturers of coal-mining machines. The letters addressed to the manufacturers asked for a statement of the number of machines actually in use each year since they were introduced, and, if possible, a record of the coal tonnage won by each make of machine during the last five years. The inquiries were coupled with the assurance that individual statements would be held confidential and that only the totals would be published. The inquiries met with cordial response and replies were received from the following companies:

Geo. S. Whitcomb Company, Chicago, Illinois. Began making machines in 1880.

Jeffrey Manufacturing Company, Columbus, Ohio. Began shipping in 1887.

Ingersoll-Sargent Drill Company, Cleveland, Ohio (also New York and Chicago). Began shipping in 1887.

Morgan-Gardner Electric Company, Chicago, Illinois. Began shipping in 1894.

Link Belt Machinery Company, Chicago, Illinois. Began making machines in 1894.

Morgan Standard Company, Chicago, Illinois. Began in 1895.

General Electric Company, Schenectady, New York. This company began making a new type of under-cutting machine in 1897.

The manufacturers were not able in all cases to state how many machines were actually in use each year, nor to give the producing records of the machines. From the replies received, however, it has

been possible to give the following approximate statement of the number of machines installed since the first mining machine was placed upon the market:

*Approximate number of mining machines installed each year in coal mines of the United States.*

| Year. | Number. | Year. | Number. |
|---|---|---|---|
| Prior to 1888 | 735 | 1894 | 305 |
| 1888 | 165 | 1895 | 440 |
| 1889 | 180 | 1896 | 565 |
| 1890 | 195 | 1897 | 597 |
| 1891 | 215 | Total | 3,872 |
| 1892 | 205 | | |
| 1893 | 270 | | |

From this it appears that there have been installed since 1880 a total of 3,872 mining machines in the coal mines of the United States. The returns from the operators show that 1,988 machines were in operation during 1897, so that there were approximately 1,874 mining machines which have been discarded or were not in actual use during 1897. Probably not more than half of these have been discarded, from which it is shown that about 75 per cent of all the mining machines installed since their use was begun are still in operation or available. It should be remembered that these statistics apply only to under-cutting machines driven by electricity or compressed air. They in no way refer to generators, haulage locomotives, or drills for blasting.

## STRIKES IN COAL MINES DURING 1897.

The general strike which occurred among the bituminous coal miners in the competitive fields of Illinois, Indiana, Ohio, and western Pennsylvania, and even extended its influence into Kentucky and West Virginia, was in some respects the most remarkable on record. It had its beginning in a fight against the New York and Cleveland Gas Coal Company of Pittsburg, because of the contracts entered into by that company with its employees, by which the company was to pay and the miners to receive 10 cents per ton less than the scale adopted for the Pittsburg region. The company maintained that as it did not own nor have any interest in a company store, but paid its employees in cash, it was entitled to make up for the store profits by paying a lower rate of wages. The miners were encouraged in their struggle by the majority of the operators in the field who held that the differential rate paid for mining by the New York and Cleveland Gas Coal Company enabled that company to market its product at lower prices than

its competitors could afford to meet. The contest was bitterly waged, but can not be said to have been entirely successful from the strikers' standpoint, so far as the original cause of complaint was concerned. The attempts to make the miners of the New York and Cleveland Company quit work by marching with bands of music and other demonstrations were only partially successful, many of those who stopped work claiming it was from fear of violence. The strike, however, was conducted in a manner so notable for its peacefulness and want of violence as to mark it as an epoch in the history of labor troubles.

The ultimate results of the strike were beneficial to the strikers. Wages were generally advanced, and were it not for the mining stores still remaining in many places as a thorn in the flesh, the conclusion of the strike would have accomplished all that was desired. The New York and Cleveland Gas Coal Company has declared its intention to pay its employees the full wage scale as soon as operators representing 95 per cent of the product in the Pittsburg field shall have abandoned mine stores and adopted the plan of paying employees in cash, enabling them to make their purchases in the open market.

This strike was inaugurated on July 5 and terminated September 15. It was remarkable in its origin, its peaceful conduct, and from the fact that the sympathy not only of the public but of their employers was with the striking miners. It was, in fact, a contest among the mining companies in which the miners were merely instrumental. It is safe to assert that the mining companies appreciated the underpaid conditions of their employees, but felt their inability to afford any amelioration of their condition in the face of existing competition.

The general strike, while it was the most important of the labor disaffections throughout the year, did not represent all of the troubles. Illinois had its own struggles apart from its participation in the general strike. The subsequent table, which contains a compilation of the statistics relating to labor troubles in the coal mines of all the States, shows that Illinois was the principal sufferer from these. In that State, as shown by the report of the bureau of labor statistics, 266 mines were affected, and 26,407 men were idle for an average of 101 days, entailing a total loss in working time of 2,660,334 days. This great loss of time, however, is not shown in the tonnage of the State, which in 1897 amounted to 286,132 tons more than in 1896. The disadvantage experienced on account of this loss of time was merely comparative. The increase in tonnage would have been much larger but for the time lost in strikes. The total number of men employed in the coal mines of Illinois in 1897 was 33,788, and the average working time 167.1 days, equivalent to a total of 5,645,975 working days. It appears from this that the time lost was equal to 47 per cent of the time made, and estimating that the efficiency per day of the men on strike was equal to that of the tonnage made during the working time, the State was

capable of producing during 1897 a total of 29,500,000 tons, against a product actually won of 20,072,758 tons.

The report of the bureau of labor statistics of Illinois divides the statistics relating to the strike of 1897 according to the important coal fields. (1) The northern field embraces the counties of Whiteside, Bureau, Lasalle, Grundy, Will, Marshall, Woodford, Livingston, and McLean. This field was the one most seriously affected by the labor troubles. The total number of men idle was 11,249, and the average time lost by each man was 131 days, involving a total loss in working time of 1,479,129 days. (2) The Rock Island field, embracing Mercer and Rock Island counties, had 893 men, employed at 15 different mines, idle for an average of 71 days, the total working time lost being 63,468 days. (3) The Peoria field, containing Peoria and Fulton counties and contiguous mines in Tazewell County, lost 61,116 working days, an average of 41 days lost by the 1,500 men on strike. (4) The Danville field is all contained in Vermilion County. In this district 1,645 men were idle 89 days, the total working time lost amounting to 146,665 days. (5) The Springfield field, embracing Logan, Menard, and the northern part of Sangamon counties, lost 190,850 days, distributed among 2,394 men, an average of 80 days for each man. (6) The Pana, Mount Olive, and Virden field, consisting of Macoupin, Christian, Shelby, and the southern part of Sangamon counties, had 3,616 men idle for an average of 106 days, the total time lost being 382,588 days. (7) The Belleville field, composed of Bond, Clinton, Madison, and St. Clair counties, had 1,749 men on strike for an average of 64 days, and a total loss of 112,733 working days. (8) The Centralia and Duquoin field, consisting of Marion, Jefferson, Washington, Randolph, Perry, and Jackson counties, lost 43,153 days in working time, 1,354 men being idle an average of 32 days. The foregoing does not include 21 mines in the State in which machines are used and at which strikes occurred with a loss of 180,632 working days, an average of 90 days for the 2,007 men on strike.

Next to Illinois, Ohio had the largest number of mines affected by the strike, but the number of men on strike and the total time lost in that State were not so large as in Pennsylvania. In Ohio the number of mines affected was 228; in Pennsylvania, 188. Ohio had 21,685 men idle for an average of 78 days, making the total time lost equivalent to 1,690,549 working days; Pennsylvania had 29,112 men on strike for 72 days, involving a total loss in working time of 2,102,336 days. In proportion to the total tonnage of the two States and the total number of men employed in the coal mines, the loss in Ohio was much greater than that in Pennsylvania. The effect of the strike in Ohio appears in a decrease of the product in 1897 as compared with the preceding year, while Pennsylvania shows a substantial increase, the counties in the central portion of the State not being affected. The total amount of time made at the Ohio coal mines was 3,900,617 work-

The following table exhibits the statistics of strikes in 1897 by States:

*Strikes in bituminous coal mines in United States during 1897.*

| State. | Number of mines where strikes occurred. | Number of men on strike. | Average number of days idle. | Total number of working days lost. |
|---|---|---|---|---|
| Alabama | 7 | 1,175 | 18 | 21,235 |
| Arkansas | 3 | 480 | 70 | 3,460 |
| Colorado | 3 | 103 | 13 | 1,231 |
| Illinois | 266 | 26,407 | 101 | 2,660,334 |
| Indiana | 57 | 5,923 | 73 | 431,837 |
| Iowa | 44 | 3,456 | 39 | 135,586 |
| Kansas | 1 | 120 | 4 | 480 |
| Kentucky | 33 | 2,818 | 110 | 309,651 |
| Michigan | 4 | 170 | 11 | 1,837 |
| Missouri | 11 | 833 | 21 | 16,844 |
| New Mexico | 4 | 380 | 7 | 2,680 |
| Ohio | 228 | 21,685 | 78 | 1,690,549 |
| Pennsylvania | 188 | 29,112 | 72 | 2,102,336 |
| Tennessee | 14 | 2,056 | 75 | 154,864 |
| Texas | 1 | 10 | 4 | 40 |
| Virginia | 1 | 300 | 30 | 9,000 |
| Washington | 1 | 200 | 24 | 4,800 |
| West Virginia | 70 | 6,136 | 54 | 328,000 |
| Wyoming | 2 | 293 | 22 | 6,469 |
| Total | 938 | 101,657 | 77½ | 7,881,233 |

According to the foregoing statement, the total number of men made idle by strikes in 1897 was 101,657, and the average time lost by each man was 77½ days. From this it would appear that the total time lost was 7,881,233 working days. Estimating the average wages earned per day by each man at $1.50, this would mean a total loss to the miners in money of $11,821,850. That this amount may be considered as lost to the men who struck is true, but it was not lost to miners as a class, for the increased production in other fields gave extra employment to miners in those fields who reaped the benefit of the losses incurred by their fellow-workmen. If the coal production of the United States had decreased in proportion to the extent of the strike, the loss to the entire mining trade would have been very great. As it was, the wages which would have been paid to the striking miners were distributed among other regions.

Maryland's entire output was paid for by run-of-mine, and all of it at the 40 to 45 cent rate, the only instance of the kind. West Virginia also helped to swell the percentage of the run-of-mine basis, 85 per cent of her total being so paid for, while in Alabama 96 per cent was paid for run-of-mine. In Ohio, on the other hand, only 200,410 tons out of a total of 8,649,065 was paid for unscreened. The statistics regarding Illinois, taken from the Illinois bureau of labor statistics, show that the proportion of run-of-mine and screened coal is nearly equal. The machine-mined product of this State is excluded from the tabulation, as only in a few instances were the rates paid for machine mining given. The pick-mined coal of Illinois included in the table amounted to 13,781,303 short tons, or about 65 per cent of the total product of the State. The State report does not separate the amount of coal passed over different-sized screens, and the statistics for Illinois lack uniformity with other States in this unimportant particular.

In Iowa only about 8 per cent of the total included in the table for that State was paid for by run-of-mine coal, leaving 92 per cent that was screened before weighing. It is also to be noted that about 60 per cent of the tonnage of Iowa included in this table was passed over 1¼-inch screens. About 60 per cent of the coal mined in Indiana and Kentucky was paid for by screened coal, while in Colorado only 22 per cent was screened.

When it comes to considering the rates paid for mining, the largest portion of the product in the ten leading States was at the 35 to 40 cent rate, a little over 21 per cent of the total being at that rate. Next comes the 25 to 30 cent rate, with about 18 per cent of the total; then the 40 to 45 cent rate, with about 12.7 per cent, followed by the 50 to 55 cent rate, with a little more than 9 per cent, and the 55 to 60 cent rate, with about 8.5 per cent. As many of the less important States are among the Rocky Mountain and the Pacific groups, higher rates prevail, more than 50 per cent being paid for at rates above 65 cents. More than 40 per cent was paid for between 65 and 80 cents. Over 1,900,000 tons was paid for at the 65 to 70 cent rate, most of which was in Washington, Wyoming, Montana, New Mexico, and Utah, all far Western States. Nearly 1,800,000 tons was at the lower 45 to 50 cent rate, all run-of-mine, in Kansas, Missouri, and Arkansas, all in the middle West. Next, about 1,600,000 tons at 90 cents to $1, chiefly in Kansas, Montana, and Texas, and all over 1-inch screens. And, finally, 1,140,000 tons at the 70 to 75 cent rate, principally in Missouri and Montana (run-of-mine and 1-inch screened), and Indian Territory (1-inch screened).

Among the ten leading States, Pennsylvania paid for nearly 12,300,000 tons at 35 to 40 cents, 10,400,000 tons at 25 to 30 cents, and 5,150,000 tons at 40 to 45 cents. When screens were used, 1½ inch was the principal size. About 2,800,000 tons were paid for at 50 to 55 cents, a little over half as much was paid for at 55 to 60 cents, and not quite half at 60 to

65 cents. Most of the coal screened over 1-inch screens or less (largely ⅞-inch screens) was paid for at 45 to 50 cent rate. Very little coal is screened over 1¼-inch screens in Pennsylvania, by far the greater portion of screened coal paid for being over 1½-inch screens. It will be observed that there is practically a steady increase in price paid with the increase in the size of the screen spaces. The 25 to 30 and 35 to 40 cent rates predominate for run-of-mine coal, the 45 to 50 cent rate for 1-inch screens, and the 50 to 55, 55 to 60, and 60 to 65 cent rates for 1½-inch screens. It is noticeable, too, that while practically no coal is passed over 1¼-inch screens in Pennsylvania, in the neighboring State, Ohio, this size of screen is used in the great majority of cases. The amount of coal reported as screened over 1¼-inch screens in Ohio was more than double that of all the other, screened and run-of-mine combined. The 1¼-inch screen predominates also for screened coal in Iowa, Indiana, and Kentucky, while the 1½-inch screen predominates in West Virginia and Colorado, and is the only size used in Alabama.

In Illinois the greater portion of run-of-mine coal is paid for between 20 and 40 cents, while most of the screened coal is paid for between 65 and 85 cents.

The table on pages 64–65 shows the amount of coal paid for at each rate given, so far as reported, according to the character of the coal, etc., in the ten leading States. It must be remembered that when screened coal is given the amount of coal stated is that which passes over the screens only, the amount of small coal and screenings varying considerably. The total tonnage, when screened coal is paid for, is from 15 to 25 per cent more than the amounts given. The States are arranged according to their rank in importance.

Tennessee stands at the head of the 14 comparatively less important States, with Kansas second, Missouri third, and Wyoming fourth. In all of these most of the miners are paid by run of-mine coal. Very little coal is screened in Tennessee, most of which is over 1½-inch screens. In Kansas and Missouri only ⅞-inch and 1-inch screens are used, and in Wyoming, outside of the Union Pacific Coal Company (see footnote to table), only 1-inch and 1¼-inch screens are used, the latter predominating. Montana miners are paid principally by coal screened over 1-inch screens, while Virginia and Washington miners are paid almost exclusively by run-of-mine. About 80 per cent of the tonnage reported by Indian Territory was 1-inch screened. In Arkansas the coal is about equally divided between run-of-mine and screened, the screens being usually 1-inch and 1¼-inch. Most of the coal produced in Texas is passed over 1-inch screens, and that of Utah over 1¼-inch screens.

The details of the rates in the foregoing States are shown in the table on pages 66–69.

*Rates paid for mining bituminous*

| State. | 20 cents and under. | Over 20 cents up to 25 cents. | Over 25 cents up to 30 cents. | Over 30 cents up to 35 cents. | Over 35 cents up to 40 cents. | Over 40 cents up to 45 cents. | Over 45 cents up to 50 cents. | Over 50 cents up to 55 cents. |
|---|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Pennsylvania: | | | | | | | | |
| Run-of-mine | 26,045 | 1,977,570 | 10,395,612 | 2,162,994 | 12,293,513 | 5,149,057 | 561,381 | 326,520 |
| 1-inch screen | ..... | ..... | ..... | ..... | 148,944 | 27,823 | 1,754,720 | 10,000 |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1¼-inch screen | ..... | 94,749 | ..... | 44,285 | 244,744 | 137,685 | 578,664 | 2,771,944 |
| 1¾-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Illinois: | | | | | | | | |
| Run-of-mine | 121,784 | 940,047 | 1,424,798 | 1,710,095 | 941,852 | 236,805 | 244,256 | 233,789 |
| Screened | ..... | 104,579 | 228,704 | 23,411 | 605,982 | 135,160 | 340,116 | 631,043 |
| West Virginia: | | | | | | | | |
| Run-of-mine | ..... | 223,984 | 3,615,249 | 2,370,394 | 540,107 | 125,215 | 60,890 | 37,747 |
| 1½-inch screen | ..... | ..... | ..... | 2,711 | 3,725 | ..... | 27,733 | 97,696 |
| 1¼-inch screen | ..... | ..... | 95,789 | 4,940 | 26,943 | 12,079 | 209,428 | ..... |
| 1¾-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 20,467 | 23,132 |
| 2-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 42,188 | ..... |
| Ohio: | | | | | | | | |
| Run-of-mine | ..... | ..... | 5,864 | 11,463 | 104,306 | 18,273 | 10,120 | 7,084 |
| 1½-inch screen | ..... | ..... | ..... | ..... | 24,985 | 133,744 | 64,557 | 2,624,044 |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 8,857 | 1,094,748 |
| 1¾-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 37,601 |
| Alabama: | | | | | | | | |
| Run of-mine | ..... | ..... | 271,533 | 403,064 | 3,367,064 | 231,423 | 438,309 | 18,566 |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Iowa: | | | | | | | | |
| Run of-mine | ..... | ..... | ..... | ..... | 18,693 | 5,766 | 58,847 | ..... |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 1,136 | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | 423 | ..... | 1,200 | ..... |
| 2-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Maryland: | | | | | | | | |
| Run-of-mine | ..... | ..... | ..... | ..... | ..... | 4,442,128 | ..... | ..... |
| Indiana: | | | | | | | | |
| Run-of-mine | ..... | 5,000 | 68,000 | 44,263 | 467,211 | 71,426 | 3,135 | 21,800 |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | 95,000 | 14,242 | 110,686 | 209,832 |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 26,000 | 22,220 |
| 2-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Kentucky: | | | | | | | | |
| Run-of-mine | 42,701 | 190,500 | 140,000 | 38,516 | 60,898 | ..... | 30,900 | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 26,463 | 27,225 |
| 1¼-inch screen | ..... | ..... | ..... | ..... | 27,961 | ..... | 78,507 | 25,000 |
| 1¾-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 2-inch screen | ..... | ..... | 46,731 | 3,626 | 33,375 | ..... | 27,538 | 3,000 |
| Colorado: | | | | | | | | |
| Run-of-mine | ..... | ..... | ..... | 9,570 | 99,133 | 954,196 | 522,217 | 270,302 |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 10,106 | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 33,500 | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 2-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total | 190,530 | 3,536,429 | 16,292,280 | 6,829,332 | 19,104,859 | 11,695,022 | 5,291,921 | 8,493,293 |

*coal in the ten leading States.*

| Over 55 cents up to 60 cents. | Over 60 cents up to 65 cents. | Over 65 cents up to 70 cents. | Over 70 cents up to 75 cents. | Over 75 cents up to 80 cents. | Over 80 cents up to 85 cents. | Over 85 cents up to 90 cents. | Over 90 cents up to $1. | Over $1. | Total. |
|---|---|---|---|---|---|---|---|---|---|
| *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 198,056 | 851,689 | 193,720 | ..... | 3,947 | ..... | ..... | ..... | ..... | 34,140,104 |
| 176,427 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | a2,117,914 |
| 49,839 | 16,600 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 66,439 |
| 1,464,734 | 1,326,026 | 52,566 | ..... | ..... | ..... | ..... | ..... | ..... | 6,715,397 |
| 41,126 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 41,126 |
| 282,757 | 33,211 | 241,256 | 29,658 | 3,868 | 1,640 | 1,440 | 10,000 | ..... | 6,457,256 |
| 178,073 | 478,723 | 1,004,849 | 1,046,036 | 1,614,247 | 769,960 | 52,589 | ..... | 111,085 | 7,324,057 |
| ..... | 28,328 | ..... | 2,910 | ..... | ..... | ..... | ..... | 2,090 | 7,006,914 |
| 147,831 | 14,300 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 293,996 |
| 75,031 | 18,936 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 443,146 |
| 7,918 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 51,517 |
| 112,500 | 125,283 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 279,971 |
| 43,300 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 200,410 |
| 2,745,425 | 193,586 | 10,146 | ..... | ..... | ..... | ..... | ..... | ..... | 5,796,487 |
| 1,290,371 | 161,612 | 3,300 | ..... | ..... | ..... | ..... | ..... | ..... | 2,558,888 |
| 55,679 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 93,280 |
| 51,028 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 4,780,987 |
| 138,620 | ..... | 51,165 | ..... | ..... | 22,657 | ..... | ..... | ..... | 212,442 |
| 3,356 | ..... | 32,200 | 11,536 | 16,389 | 655 | 30,129 | 1,420 | ..... | 178,991 |
| ..... | ..... | 27,179 | ..... | 104,787 | 11,011 | 139,300 | 5,860 | ..... | 288,137 |
| 6,553 | ..... | 195,818 | 992,815 | 107,799 | 20,364 | 129,297 | 8,297 | ..... | 1,462,079 |
| 1,394 | ..... | 6,000 | 316,184 | 111,982 | 59,917 | 25,284 | ..... | 7,279 | 529,663 |
| ..... | ..... | 8,456 | ..... | ..... | ..... | ..... | ..... | ..... | 8,456 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 4,442,128 |
| 140,325 | 4,304 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 825,464 |
| 1,750 | 64,279 | 256,004 | 400 | ..... | ..... | ..... | ..... | ..... | 322,433 |
| 183,327 | 64,534 | 211,596 | 3,548 | ..... | ..... | ..... | ..... | ..... | 892,765 |
| 224,034 | 3,274 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 275,528 |
| 1,000 | 4,200 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5,200 |
| 28,557 | 2,240 | ..... | 8,900 | ..... | ..... | ..... | ..... | ..... | 538,212 |
| 61,813 | 257,055 | 35,690 | 53,503 | 23,334 | 9,326 | ..... | ..... | ..... | 494,409 |
| 30,000 | 141,856 | 42,029 | 10,957 | ..... | ..... | ..... | ..... | 3,202 | 359,512 |
| ..... | 47,232 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 47,232 |
| ..... | 100,688 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 214,958 |
| 29,502 | 4,000 | 104,202 | ..... | ..... | 2,150 | ..... | ..... | ..... | 1,995,272 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,327 | 11,433 |
| ..... | ..... | 49,941 | ..... | 65,853 | ..... | 16,979 | 396 | ..... | 166,669 |
| ..... | ..... | 192,537 | ..... | ..... | ..... | 43,766 | 145,101 | ..... | 381,404 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,100 | ..... | 1,100 |
| 7,770,326 | 3,941,956 | 2,718,154 | 2,471,447 | 2,052,206 | 897,680 | 438,784 | 172,174 | 124,983 | 92,021,376 |

a1,923,072 tons over ¾-inch screen.

*Rates paid for mining bituminous*

| State or Territory. | 20 cents and under. | Over 20 cents up to 25 cents. | Over 25 cents up to 30 cents. | Over 30 cents up to 35 cents. | Over 35 cents up to 40 cents. | Over 40 cents up to 45 cents. | Over 45 cents up to 50 cents. | Over 50 cents up to 55 cents. |
|---|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Tennessee: | | | | | | | | |
| Run-of-mine | ..... | ..... | 192,190 | 162,477 | 875,620 | 281,961 | 211,481 | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1¾-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Kansas: | | | | | | | | |
| Run-of-mine | ..... | ..... | ..... | ..... | ..... | ..... | 363,557 | ..... |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 2,320 | ..... |
| Missouri: | | | | | | | | |
| Run-of-mine | ..... | ..... | ..... | ..... | ..... | 361,142 | 666,314 | 36,912 |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 1,500 | ..... |
| Wyoming: *b* | | | | | | | | |
| Run-of-mine | ..... | ..... | ..... | 227,000 | ..... | 1,646 | 60,684 | ..... |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Montana: | | | | | | | | |
| Run-of-mine | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | 120,186 | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Virginia: | | | | | | | | |
| Run-of-mine | ..... | 214,034 | 162,567 | 170,356 | 10,193 | ..... | ..... | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Washington: | | | | | | | | |
| Run-of-mine | ..... | ..... | ..... | ..... | ..... | ..... | 13,825 | 125,535 |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Indian Territory: | | | | | | | | |
| Run-of-mine | ..... | ..... | 49,499 | ..... | ..... | 71,265 | ..... | ..... |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Arkansas: | | | | | | | | |
| Run-of-mine | | 10,671 | ..... | ..... | ..... | 700 | 317,654 | ..... |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1¼-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| New Mexico: | | | | | | | | |
| Run of-mine | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 2-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Texas: | | | | | | | | |
| 1 inch screen | ..... | ..... | 23,400 | 56,500 | 10,800 | 15,750 | ..... | ..... |
| 1¼ inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1½-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1¾-inch screen | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

*a* 683,702 tons over ¼-inch screen.

*b* Production of Union Pacific Coal Company, about 900,000 tons, not included: Rates paid for mining, from 55 to 70 cents a ton; size of screens used, ¼-inch, ½-inch, ¾-inch, 1-inch, 1¼-inch, and 1¾-inch; amounts not reported. In California the rate for run-of-mine was from 60 to 75 cents.

*coal in fourteen States.*

| Over 55 cents up to 60 cents. | Over 60 cents up to 65 cents. | Over 65 cents up to 70 cents. | Over 70 cents up to 75 cents. | Over 75 cents up to 80 cents. | Over 80 cents up to 85 cents. | Over 85 cents up to 90 cents. | Over 90 cents up to $1. | Over $1. | Total. |
|---|---|---|---|---|---|---|---|---|---|
| *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| ..... | 8,109 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,731,838 |
| ..... | 7,988 | 19,628 | 6,810 | ..... | ..... | ..... | ..... | ..... | 34,426 |
| ..... | 29,989 | 22,693 | ..... | 8,706 | 6,173 | 9,377 | ..... | ..... | 76,938 |
| ..... | 12,300 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 12,300 |
| 478,606 | ..... | ..... | ..... | 84,229 | 7,993 | 92,850 | ..... | ..... | 1,027,235 |
| ..... | ..... | ..... | 25,933 | 302,261 | 12,800 | 293,561 | 375,021 | ..... | a1,011,896 |
| 34,213 | 13,944 | 32,676 | 119,149 | 2,228 | 6,589 | 260,531 | 112,936 | 41,412 | 1,668,046 |
| 10,931 | ..... | 50,618 | 133,521 | 6,148 | ..... | 19,230 | ..... | ..... | 221,948 |
| 2,042 | 391,670 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 683,042 |
| ..... | ..... | 137,389 | ..... | ..... | ..... | 3,000 | ..... | ..... | 140,389 |
| ..... | ..... | 185,883 | ..... | ..... | ..... | ..... | ..... | ..... | 185,883 |
| ..... | ..... | 1,100 | 111,200 | 4,389 | 131,413 | 1,125 | 1,200 | ..... | 250,427 |
| ..... | ..... | 302,372 | 243,678 | ..... | ..... | ..... | 582,202 | ..... | 1,248,488 |
| ..... | ..... | ..... | 2,083 | ..... | ..... | ..... | 35,000 | ..... | 37,083 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 557,150 |
| ..... | ..... | ..... | 2,000 | ..... | 487 | ..... | ..... | ..... | 2,487 |
| 21,000 | 46,171 | 299,188 | ..... | 368,297 | ..... | ..... | ..... | ..... | 874,016 |
| ..... | ..... | ..... | 700 | ..... | ..... | ..... | ..... | ..... | 700 |
| ..... | 1,863 | ..... | ..... | ..... | 1,900 | ..... | ..... | ..... | 3,763 |
| 11,972 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 132,736 |
| ..... | ..... | ..... | 455,305 | ..... | ..... | ..... | ..... | ..... | 455,305 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 329,025 |
| ..... | ..... | 65,406 | ..... | 91,272 | ..... | ..... | ..... | ..... | 156,678 |
| ..... | ..... | 60,122 | ..... | 85,303 | ..... | ..... | ..... | ..... | 145,425 |
| ..... | ..... | ..... | ..... | ..... | ..... | 10,000 | 20,000 | ..... | 30,000 |
| ..... | ..... | 362,546 | 300 | ..... | 97,292 | 13,600 | 8,900 | ..... | 482,638 |
| ..... | ..... | 102,836 | ..... | ..... | ..... | ..... | 2,498 | ..... | 105,334 |
| ..... | ..... | ..... | 12,000 | ..... | ..... | ..... | ..... | ..... | 12,000 |
| ..... | ..... | 562 | ..... | ..... | ..... | ..... | ..... | ..... | 562 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | 372,825 | ..... | 479,275 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | 20,641 | ..... | 20,641 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 140 | 140 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | 34,673 | ..... | 34,673 |

*Rates paid for mining bituminous coal*

| State or Territory. | 20 cents and under. | Over 20 cents up to 25 cents. | Over 25 cents up to 30 cents. | Over 30 cents up to 35 cents. | Over 35 cents up to 40 cents. | Over 40 cents up to 45 cents. | Over 45 cents up to 50 cents. | Over 50 cents up to 55 cents. |
|---|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Utah: | | | | | | | | |
| Run-of-mine | | | | | | | | |
| 1-inch screen | | | | | | | | 23,641 |
| 1¼-inch screen | | | | | | | | |
| 1½-inch screen | | | 7,028 | 25,967 | | | | |
| 2-inch screen | | | | | | | | |
| Michigan: | | | | | | | | |
| Run-of-mine | | | | | | | | |
| 1-inch screen | | | | | | | | |
| 1¼-inch screen | | | | | | | 18,283 | |
| Oregon: | | | | | | | | |
| 1-inch screen | | | | | | | | |
| 1¼-inch screen | | | | | | | | |
| Total | | 224,705 | 434,684 | 642,300 | 896,613 | 732,464 | 1,775,804 | 186,088 |

*in fourteen States*—Continued.

| Over 55 cents up to 60 cents. | Over 60 cents up to 65 cents. | Over 65 cents up to 70 cents. | Over 70 cents up to 75 cents. | Over 75 cents up to 80 cents. | Over 80 cents up to 85 cents. | Over 85 cents up to 90 cents. | Over 90 cents up to $1. | Over $1. | Total. |
|---|---|---|---|---|---|---|---|---|---|
| *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| ..... | ..... | ..... | 500 | ..... | ..... | ..... | ..... | ..... | 500 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 23,641 |
| 212,387 | ..... | 139,713 | ..... | ..... | 93,140 | ..... | ..... | ..... | 445,240 |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 32,995 |
| ..... | ..... | 12,376 | ..... | ..... | ..... | ..... | ..... | ..... | 12,376 |
| ..... | ..... | 12,000 | 26,800 | 5,374 | ..... | 24,790 | 3,006 | ..... | 71,970 |
| ..... | ..... | 59,050 | ..... | ..... | ..... | 38,467 | 1,400 | ..... | 98,917 |
| ..... | ..... | ..... | ..... | 10,197 | ..... | 14,000 | ..... | ..... | 42,480 |
| ..... | ..... | ..... | 1,200 | 3,100 | ..... | ..... | 44,800 | ..... | 49,100 |
| ..... | ..... | 46,660 | ..... | ..... | ..... | ..... | ..... | ..... | 46,660 |
| 771,151 | 512,034 | 1,912,818 | 1,141,179 | 971,504 | 357,787 | 780,531 | 1,615,102 | 41,552 | 12,996,316 |

In connection with the statistics presented above, the following agreement, made and entered into in joint interstate convention in Chicago, Illinois, January 26, 1898, between the operators and miners of Illinois, Indiana, Ohio, and western Pennsylvania (the Pittsburg thin-vein district), will be found of interest:

1. That an equal price for mining screened lump coal shall hereafter form a base scale in all the districts above named, excepting the State of Illinois, the block-coal district of Indiana to pay 10 cents per ton over that of Hocking Valley, western Pennsylvania, and Indiana bituminous district, and that the price of pick run-of-mine coal in Hocking Valley and western Pennsylvania shall be determined by the actual percentage of screenings passing through such screen as is hereinafter provided; it being understood and agreed that screened or run-of-mine coal may be mined and paid for on the above basis at the option of the operators, according to market requirements, and the operators of Indiana bituminous shall also have like option of mining and paying for run-of-mine or screen coal.

2. That the screen hereby adopted for the State of Ohio, western Pennsylvania, and the bituminous district of Indiana shall be uniform in size, 6 feet wide by 12 feet long, built of flat or akron-shaped bar of not less than five-eighths of an inch surface, with 1¼ inches between bars, free from obstructions, and that such screen shall rest upon a sufficient number of bearings to hold the bars in proper position.

3. That the block-coal district of Indiana may continue the use of the diamond screen of present size and pattern, with the privilege of run-of-mine coal, the mining price of which shall be determined by the actual screenings, and that the State of Illinois shall be absolutely upon a run-of-mine system, and shall be paid for on that basis.

4. That an advance of 10 cents per ton of 2,000 pounds for pick-mined screened coal shall take effect in western Pennsylvania, Hocking Valley, and Indiana bituminous districts on April 1, 1898; and that Grape Creek, Illinois, and the bituminous district of Indiana shall pay 40 cents per ton run-of-mine coal from and after same date, based upon 66 cents per ton screen coal in Ohio, western Pennsylvania, and the Indiana bituminous district; same to continue in force until the expiration of this contract.

5. That on and after April 1, 1898, the eight-hour workday with eight hours' pay, consisting of six days per week, shall be in effect in all the districts represented, and that uniform wages for day labor shall be paid the different classes of labor in the fields named; and that internal differences in any of the States or districts, both as to prices or conditions, shall be referred to the States or districts affected for adjustment.

6. That the same relative prices and conditions between machine and pick mining that have existed in the different States shall be continued during the life of this contract.

7. That present prices for pick and machine mining and all classes of day labor shall be maintained in the competitive States and districts until April 1, 1898.

8. That the United Mineworkers' organization, a party to this contract, do hereby further agree to afford all possible protection to the trade and to the other parties hereto against any unfair competition resulting from a failure to maintain scale rates.

9. That this contract shall remain in full force and effect from April 1, 1898, to April 1, 1899, and that our next annual interstate convention shall convene in the city of Pittsburg on the third Tuesday in January, 1899.

## COAL TRADE REVIEW.

A study of the conditions which affected the anthracite coal trade in 1897 reveals the fact that anthracite producers must look to some other solution of the problems which confront them than simply restricting production and maintaining prices. The statistics presented in this report indicate that the operators have been able to accomplish these results with a fair amount of success during 1896 and 1897; but other conditions have developed from these. Higher prices for anthracite have caused consumers to consider other kinds of fuel, and the year just closed shows that bituminous coal for steaming purposes and coke and gas for domestic purposes are encroaching upon the territory formerly occupied exclusively by anthracite coal. This has already been referred to in discussing the statistics of production, and is mentioned again here because the reports on the trade in the various cities, contained in the following pages, emphasize the facts brought out in the statistical tables. The reviews of the movements of coal at the trade centers show that in nearly every instance the receipts of anthracite coal decreased in 1897, while the receipts of bituminous coal, almost without exception, increased, and in the few instances that anthracite receipts were ahead of 1896, they were not at all in proportion to the increase in the receipts of bituminous coal. Moreover, notwithstanding the restricted production, considerable quantities of anthracite coal were carried over unsold at the end of the year, showing that the demand was not equal to even the smaller output.

Bituminous production continues to be marked by keen competition and excessive production. Prices were lower than ever in 1897, in spite of increased consumption, due to exceptional pig-iron production, and a temporary period of higher prices induced by the strike and its resulting coal famine. Operators are endeavoring to meet the lower prices by lowering the cost of production in the use of mining machines. The result so far reached seems to be a larger, though doubtless cheaper, output, which, by adding to an already glutted market, must eventuate in still lower prices and a sacrifice of the benefits derived from the use of machines.

The movements of coal at the trade centers and shipping ports are treated in the following pages.

### NEW YORK CITY.

The following review of the conditions affecting the wholesale and retail coal trade of New York City is extracted from Mr. F. E. Saward's annual report, The Coal Trade:

The city of New York and its vicinity form a locality where more coal is sold and handled in the course of the year than anywhere else in the world except the city of London, England. In its vicinity are the shipping ports of millions of tons of every grade and quality of anthracite and bituminous coal, so that 15,000,000 tons is probably an

underestimate of the sales actually consummated at this point. The several shipping points on the New Jersey shore of the Hudson River, the Kill von Kull, and Raritan Bay, known as South Amboy, Perth Amboy, Port Reading, Elizabethport, Port Johnson, Port Liberty, Jersey City, Hoboken, and Weehawken, are feeders to the trade of the metropolis for local use and for shipment to eastern ports. The docks of the Pennsylvania Coal Company, at Newburg, New York; the Delaware and Hudson Canal Company's railroad, at Rondout, New York; the New York, Lake Erie and Western Railroad, at Piermont, New York, and the Ontario and Western Railroad, at Cornwall, New York, also furnish tribute to the trade of the parties doing business here.

The quantity used locally is set down at 6,000,000 tons, to which may be added 2,750,000 tons for Jersey City and Brooklyn.

Bituminous coal comes in schooners and steam colliers from Norfolk, Newport News, and Baltimore, and in barges from South Amboy, Port Reading, and Port Liberty, New Jersey, and is used locally for all the purposes to which it is adapted. An approximate statement of the bituminous coal loaded into ocean steamers at the port of New York shows that there are over 1,500,000 long tons annually so taken.

The year was not a good one from the point of view of the anthracite producer, either in the matter of tonnage won or of the quantity disposed of, and it is evident that an arrangement for handling the output of this important fuel supply is absolutely necessary, if the interests of the owners are to be protected. As a matter of interest to the public, it is not likely that they will object if the usual oversupply continues, bringing in its train the low range of prices.

The nominal opening prices were as below, free on board at the loading ports, in the beginning of the years named:

*Opening prices for anthracite coal at New York loading ports.*

| Year. | Free-burning coal. | | | |
|---|---|---|---|---|
| | Broken. | Egg. | Stove. | Chestnut. |
| 1890 | $3.40 | $3.50 | $3.50 | $3.25 |
| 1891 | 3.50 | 4.60 | 3.75 | 3.50 |
| 1892 | 3.65 | 3.75 | 3.90 | 3.65 |
| 1893 | 3.90 | 3.90 | 4.15 | 4.15 |
| 1894 | 3.50 | 3.50 | 3.75 | 3.75 |
| 1895 | 3.35 | 3.35 | 3.50 | 3.35 |
| 1896 | 3.25 | 3.50 | 3.75 | 3.50 |
| 1897 | 3.75 | 4.00 | 4.25 | 4.00 |

It was not possible to realize prices at any time during 1897, for even at the usual busy season, during September and October, the net result was fully 10 per cent off this list. A list issued in July showed an advance of 25 cents per ton over the quotations above given, but

no sales were made at such figures; in fact, after the middle of August all hope of list prices being realized was abandoned.

As showing the fluctuation in the value of certain grades of anthracite throughout the year, the following schedule of tide-water averages is appended. These averages include the sizes of commercial coal known as broken, egg, stove, chestnut, pea, and buckwheat:

*Average monthly prices for all sizes of anthracite coal at New York in 1896 and 1897.*

| Month. | 1897. | 1896. | Difference. |
|---|---|---|---|
| January | $2.85 | $2.65 | *a* $0.20 |
| February | 3.11 | 2.70 | *a* .40 |
| March | 3.10 | 2.82 | *a* .28 |
| April | 3.11 | 2.87 | *a* .24 |
| May | 3.09 | 2.90 | *a* .19 |
| June | 3.10 | 2.97 | *a* .13 |
| July | 3.12 | 3.03 | *a* .09 |
| August | 3.12 | 3.03 | *a* .09 |
| September | 3.14 | 3.23 | *b* .09 |
| October | 3.11 | 3.18 | *b* .07 |
| November | 3.00 | 3.18 | *b* .18 |
| December | 3.00 | 3.07 | *b* .07 |

*a* Increase. *b* Decrease.

The range of prices is a low one, and too low for this fuel, in view of cost and charges. An improvement is noticed in price the past year as compared with that preceding, in months when tonnage was kept back, and this was lost as the tonnage grew beyond market requirements. The trade has grown in past years, as is shown in the fact that in 1850 the shipments reached 3,358,899 tons; in 1860, 8,513,123 tons; in 1870, 15,849,800 tons; in 1880, 23,437,242 tons; in 1890, 35,865,174 tons, and in 1895, 46,511,477 tons. This apparently was high-water mark, for shipments in the past two years have fallen off materially.

There was no pool, agreement, or anything like it on soft coal, and the result was a good year of low prices, which to those who have known this trade for any length of time is marvelous. Mining rates have suffered materially, but freight charges have been cut to a very low rate. It is doubtful if the carrying companies get 3 mills per ton per mile for hauling soft coal from the mines to tide-water. This gives cheap fuel to the industrials of the country, far below anything that can be had elsewhere, but it has put many of the carriers into the hands of receivers. A fair exhibit of the course of prices of the best Georges Creek coal is shown below:

*Prices of Georges Creek coal at New York, 1890 to 1897.*

| | | | |
|---|---|---|---|
| 1890 | $3.50 | 1894 | $3.00 |
| 1891 | 3.50 | 1895 | 2.75 |
| 1892 | 3.40 | 1896 | 3.00 |
| 1893 | 3.25 | 1897 | 2.60 |

The Anthracite Operators' Association, representing the individual producers, in its report for the year, states:

In January, 1897, the market had been broken by shipping in November and December of the previous year a tonnage largely in excess of the needs for consumption. There had been a steady gain in the selling price until the middle of November, but at that time the break occurred, and during the latter half of that month prices went down steadily, following the same course in December. Consequently, in January, the market was badly demoralized, although the shipments were much less than in the preceding month. The results for the previous year had been so alarming that the varied interests saw that their safety lay in producing only what the market required for actual consumption. As a result, the prices in February showed a slight improvement, which continued to gain steadily until July, for during that time the output was not in excess of the demand. In estimating the requirements for the latter month, however, too optimistic a view was taken of the situation, and mining began at the rate of 3,500,000 tons for the month. Though this was clearly more than was needed, it would not have brought about any lasting disarrangement had it not been exceeded, but toward the close of the month it was found that much more than this quantity would be produced, and that efforts were being made to dispose of it. Prices were affected at once, and as the tonnage for August and the succeeding months was also greatly in excess of the needs of the market, the downward step which began in July continued without abatement.

## BOSTON, MASSACHUSETTS.

Mr. Elwyn G. Preston, secretary of the Boston Chamber of Commerce, presents the following review of the coal trade of that city.

The receipts of coal at Boston for the past fifteen years have been as follows:

*Receipts of coal at Boston for fifteen years.*

| Year. | Domestic. | | | Foreign. | Total. |
|---|---|---|---|---|---|
| | By water. | | All rail (largely bituminous). | | |
| | Anthracite. | Bituminous. | | | |
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| 1883 | ..... | ..... | ..... | ..... | 2,273,068 |
| 1884 | ..... | ..... | ..... | ..... | 2,225,740 |
| 1885 | ..... | ..... | ..... | ..... | 2,221,220 |
| 1886 | ..... | ..... | ..... | 44,464 | 2,500,000 |
| 1887 | ..... | ..... | ..... | 13,966 | 2,400,000 |
| 1888 | 2,057,279 | 1,004,195 | ..... | 10,081 | 3,071,555 |
| 1889 | 1,647,348 | 914,966 | ..... | 5,538 | 2,567,852 |
| 1890 | 1,740,564 | 964,857 | ..... | 14,072 | 2,719,493 |
| 1891 | 2,039,443 | 1,070,088 | ..... | 5,842 | 3,115,373 |
| 1892 | 2,163,984 | 919,815 | ..... | 1,416 | 3,085,215 |
| 1893 | 2,227,086 | 1,100,384 | 50,000 | 17,097 | 3,394,567 |
| 1894 | 2,237,599 | 958,701 | 71,303 | 41,779 | 3,309,382 |
| 1895 | 2,518,441 | 977,762 | 90,999 | 21,009 | 3,608,211 |
| 1896 | 2,092,798 | 1,391,949 | 104,080 | 61,071 | 3,649,898 |
| 1897 | 1,948,283 | 1,591,245 | 98,510 | 50,235 | 3,688,273 |

The figures for 1897 are the largest in the history of the port. The falling off in the receipts of anthracite coal were more than counterbalanced by the increased receipts of bituminous.

Of the total amount of domestic coal received, 1,152,712 tons, substantially one-third, were forwarded to interior New England points, making the net receipts of the city of Boston, representing consumption, 2,535,561 tons.

The combination among the principal local dealers has maintained prices at a profitable level throughout the year and trade has been generally satisfactory.

The restricted production has affected the local dealers favorably, contributing the strength and confidence that has been lacking in years of unrestricted and excessive production.

In the bituminous market unusual activity was caused by the miners' strike, owing to fears entertained by many of the mills and other large consumers of running out of coal supply.

The receipts of foreign coal were less than during 1896, amounting to but 50,235 tons, substantially the whole amount from Cape Breton.

Carriers' rates have covered a wide range, the average being about as during the previous years. The range of published prices during the year from the different ports was as follows:

*Coal freights to Boston, Massachusetts.*

| From— | Per ton. |
|---|---|
| Philadelphia | $0.55 to $0.95 |
| Baltimore | .60 to 1.00 |
| Norfolk and Newport News | .55 to .85 |
| New York | .40 to .65 |

The highest rates were reached in February and November; the lowest in July.

The year opened with stove coal at $6 and a quiet market, owing to unfavorable weather conditions and a somewhat heavily stocked market. The market showed some improvement beginning with March, and the trade during the next three months was quite satisfactory as to volume. A reduction in price to $5.50 was made in May, at which figure the price remained until the last of August, when an advance to $6 was inaugurated.

In the bituminous market trade has been quite uniform throughout the year, with no unusual features save those contributed during the continuance of the coal miners' strike.

The year opened with Georges Creek Cumberland quoted at $3.80, at which price it remained during the first four months of the year. A reduction was made in May to $3.60; later, prices ranged from $3.50 to $3.75, remaining within these limits during the remainder of the year. The large movement of coal at times during the continuance of the

strike rendered the volume light during the later months of the year. The following table shows the monthly receipts of coal at Boston during 1897:

*Monthly receipts of coal at Boston during 1897.*

| Month. | Domestic. | | | Foreign. | Total. |
|---|---|---|---|---|---|
| | By water. | | All rail (anthracite and bituminous). | | |
| | Anthracite. | Bituminous. | | | |
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| January ..... | 121,204 | 106,234 | 6,889 | 6,975 | 241,302 |
| February .... | 121,545 | 80,142 | 7,256 | 4,306 | 213,249 |
| March ..... | 134,998 | 128,404 | 11,488 | 4.856 | 279,746 |
| April ..... | 165,147 | 145,331 | 7,072 | 6,383 | 323,933 |
| May..... | 176,886 | 135,434 | 7,517 | 6,254 | 326,091 |
| June ..... | 174,805 | 107,982 | 8,956 | 3,517 | 295,260 |
| July ..... | 199,749 | 111,675 | 10,002 | 8,305 | 329.731 |
| August..... | 214,189 | 187,222 | 8,754 | 2,610 | 412,775 |
| September ... | 179,294 | 159,802 | 5,426 | 2,787 | 347,309 |
| October ..... | 149,889 | 113,553 | 8,445 | 2,641 | 274,528 |
| November.... | 151,550 | 144,537 | 7,881 | 781 | 304,749 |
| December .... | 159,027 | 170,929 | 8,824 | 820 | 339,600 |
| Total .. | 1,948,283 | 1,591,245 | 98,510 | 50,235 | 3,688,273 |

## PHILADELPHIA, PENNSYLVANIA.

Mr. John S. Arndt, financial editor of the Inquirer, furnishes the following interesting contribution regarding the coal trade of Philadelphia, continuing and supplementing reports by him in previous volumes of Mineral Resources.

The year 1897 in the coal trade at Philadelphia was among the best as to tonnage and among the worst as to profits of recent years. The aggregate shipments of anthracite and bituminous coal to Philadelphia were 9,801,000 long tons, a very considerable gain as compared with the 8,859,000 long tons shipped here in 1896, and almost equal to the record-breaking shipments of 9,914,000 long tons in the year 1895. But while there is little ground for complaint as to the amount of business done, yet the increased competition of bituminous coal in the market with the high-priced anthracite, and the consequent low prices realized, made the trade disappointing in the matter of profits to miners, shippers, and carriers of both kinds of fuel. Two small railroads owned in this city, whose traffic consists almost exclusively of bituminous coal hauled to one of the trunk lines for carriage to Philadelphia, were so severely affected by the lack of profits that one was compelled to pass the dividend on its entire capital stock and the other

adopting soft coal for fuel. In 1896 its price for local consumption was $2.50 or $2.65, delivered on tracks in consumers' yards, and at these prices many manufacturers operating extensive plants found it economical either used alone or mixed with the smaller sizes of anthracite. The price for 1897 was originally fixed at $2.50, but was reduced to $2 when the collapse came in the tide-water market. As against $1.30 received for tide-water shipments this price of $2 made the business very desirable for the producing interests, and the city was canvassed thoroughly for customers. The result was that many manufacturers abandoned anthracite altogether, as did also many steam raisers in the heart of the city. Two of the leading hotels, the post-office building, and several other important buildings were equipped with an apparatus said to consume 95 per cent of the smoke produced in combustion, and used bituminous coal for the first time, and with satisfactory results. The board of health has made no complaint about the matter, and presumably, therefore, they have no occasion to interfere. One sugar refinery, two electric-light companies, and a host of smaller consumers also made the change to bituminous coal, and the inference is that this fuel will continue to be used unless it should advance materially in price, a contingency that now seems improbable. The cost of buckwheat coal to manufacturers is not less than $2, delivered in their yards, and bituminous costs no more, while it is claimed to be 25 per cent more valuable as a steam raiser than anthracite of buckwheat size. Rice and culm may be had from anthracite producers for $1.60, delivered, and perhaps for $1.50, but these are less efficient as steam raisers than is buckwheat. This very important gain in local territory has encouraged bituminous operators considerably, and their operations along this line will be extended into other desirable markets during the present year.

### THE ANTHRACITE TRADE.

Up to midsummer the anthracite trade was firm and the producing interests manifestly had control of the situation, but the large production in July and August changed the tone of the market completely; prices became unsettled, and dealers refused to lay in as large stocks as usual for the winter. Still the shipments from this port to cities and towns outside the capes of the Delaware were 1,600,000 tons as against 1,770,000 tons in the year 1896 and 1,750,000 tons in the year 1895, showing that in its coastwise business Philadelphia about retained its position and shipped its proper proportion of the reduced production of the country. The local demand was also very satisfactory in view of the substantial loss that was sustained to the bituminous interest.

The local consumption of anthracite is placed at 3,570,000 long tons as against 3,780,000 long tons in 1896 and 3,960,000 long tons in 1895; a very considerable gain under existing circumstances. Two reasons

are assigned for the increase, first, the improvement in business conditions, which induced a greater consumption of coal by householders, and second, the steady growth of the city's population. Moreover, during most of the year—certainly up to August—prices were very well maintained, but in the fall months there was a good deal of cutting by individual producers. The price circulars of the Philadelphia and Reading Coal and Iron Company, which constitute the standard, quoted the following prices on January 1, July 1, and October 1, 1897, the circular prices for 1896 being given for the purpose of comparison:

*Prices at mines of anthracite coal for Philadelphia delivery in 1896 and 1897.*

| Size. | 1896. | | | 1897. | | |
|---|---|---|---|---|---|---|
| | January. | July. | September. | January. | July. | October. |
| Lump and steamboat... | $2.50 | $2.50 | $2.50 | $2.50 | $2.50 | $2.50 |
| Broken..... | 2.25 | 2.40 | 2.50 | 2.50 | 2.45 | 2.50 |
| Egg..... | 2.65 | 2.80 | 2.90 | 2.90 | 2.80 | 2.90 |
| Stove ..... | 2.75 | 2.90 | 3.00 | 3.00 | 2.90 | 3.00 |
| Chestnut..... | 2.50 | 2.65 | 2.80 | 2.80 | 2.65 | 2.80 |
| Pea ..... | 1.30 | 1.30 | 1.30 | 1.30 | 1.30 | 1.30 |
| Buckwheat..... | .85 | .85 | .85 | .85 | .85 | .85 |

These prices are subject to the usual agents' commission of 15 cents per ton. They are for coal free on board cars at the mines, and railroad freight charges must be paid in addition. While nominally prices changed but little, in the latter months of the year, as indicated above, there was a good deal of weakness. There is always some cutting of prices, but generally it is of a character that can be ignored, as the seller who cuts prices, almost always an individual operator, finds it advantageous, owing to the development of unforeseen contingencies in his business, to dispose of a quantity of coal promptly, and when the few cargoes he has to offer are disposed of, he is out of the market for an indefinite period except at full circular prices. Competition of this irregular character is never dangerous, and does not fix the market price for the commodity. But in the fall of 1897 there was an exceptional number of cases of this kind, and they developed into a regular supply when the tide-water prices dropped without any reduction being made in the local circular. As the local market was above its normal parity with the tide-water market, operators simply directed their shipments from tide-water to this city, and were able to make a profit even when cutting prices here from 25 to 50 cents per ton on some sizes. This weakness had not been altogether obviated at the end of the season.

There was no change in freight rates for local delivery during the

year. The charges, which vary according to the region from which the shipment is made and according to the size of coal, were as follows:

*Freight rates on anthracite coal from regions to Philadelphia.*

| Regions. | Prepared sizes. | Pea. | Buckwheat. |
|---|---|---|---|
| Schuylkill | $1.70 | $1.40 | $1.25 |
| Lehigh | 1.75 | 1.45 | 1.30 |
| Wyoming | 1.80 | 1.50 | 1.35 |

The tendency to withdraw pea coal from the list of manufacturing sizes and classify it as a domestic fuel was even more noticeable in 1897 than in previous years. In 1895 not more than 33 per cent of the pea coal sent to this city was used by housekeepers. In 1896 the proportion had risen to 40 per cent, and in 1897 probably 66 per cent was so consumed. At the close of the year pea coal was used at the power stations of the passenger-railway companies, at the pumping stations of the water department, and in the establishments of a few steam raisers in the heart of the city, but nearly all the rest went into retail dealers' yards for domestic distribution. Great improvements have been made in the machinery for preparing this coal for the market, and it now comes uniform in size and free from slate and dirt. It retails at $3.75 per long ton as against $5.75 per long ton for egg, stove, and chestnut; a very important saving for the consumer. It costs the dealer $2.65 per long ton delivered as against $4.70 per long ton for stove, so that there is as much profit to him in selling the small coal as the larger and more expensive size, and he is therefore inclined to favor its more extensive use.

Naturally, the greater demand for this size has been at the expense of the higher-priced coals, and the producing interests are the sufferers by the substitution of what was once a waste material as a standard product. This loss, as will readily be seen, is the difference between $2.65 and $4.70, and when this difference is measured upon the large quantity of pea coal now consumed by housekeepers it becomes a very important matter.

It has been about decided that either the price of pea coal at the mines must be advanced or the freight charge increased in order to check to some extent this displacement of the more profitable sizes. But it is noticeable that all classes of consumers are breaking away from the old traditions that impelled them to use certain sizes for certain purposes, and the tendency is unmistakably in the direction of using smaller sizes throughout. Some housekeepers, who formerly burned egg and stove coal in their furnaces during the winter, are now burning chestnut, and they claim with satisfactory results; and furnaces designed to burn pea coal have been put upon the market, from the use

of which good results are expected. It is not altogether certain, therefore, that even an extreme advance of $1 in the cost of pea coal will induce a general return to the larger sizes.

While pea coal is thus gradually being withdrawn from the reach of manufacturers, they in turn are seeking smaller sizes. Some now consume the lower-priced buckwheat or No. 2 pea, and some have taken up the even cheaper rice. One modern-built plant, originally designed to consume pea coal, has in the course of two years successfully changed, first to buckwheat, then to rice, and now exclusively consumes the screenings from the yards of retailers, which can be had for not over $1 per ton.

## THE EXPORT TRADE.

The shipments of coal to foreign countries out of this port were again small, although somewhat larger than in 1896. Nearly all of the anthracite coal exported was sent to Canada, and nearly all of the bituminous coal exported was sent to Cuba or the other West Indian Islands.

The insurrection in Cuba naturally restricted the shipments there, and entirely prevented any development of the business. The whole problem of sending coal to Cuba is involved in the question of the supply of vessels. The Pennsylvania Steel Company, of Harrisburg Pennsylvania, and Sparrows Point, Maryland, and the Bethlehem Iron Company, of Bethlehem, Pennsylvania, jointly own the rich iron ore mines at Juragua, near Santiago de Cuba, which are capable of a much greater production than at present, and which would be developed if tranquillity reigned on the island. With the certainty of a back loading, an ample supply of vessels could be obtained to carry coal to Cuba, and a large business built up. There has been some investigation into the possibility of a market for coal in Mexico, and some results of this inquiry may possibly be seen in another year.

The supply of vessels for coastwise ports was ample during the year, and freight rates were somewhat higher, ruling at from 60 to 75 cents per ton during the open season, against 50 to 65 cents in 1896. A manifest change is taking place in the method of handling this coastwise business, as the producers and the railroad companies are equipping themselves with fleets of barges to carry coal to their customers in New England. Three years ago not over 33 per cent of the coal shipped from this port to New England seaboard cities was carried in bottoms belonging to the mining or railroad companies, but in 1897 fully 70 per cent of the tonnage was so carried, and the percentage promises to increase until practically the whole business will be so conducted. This practice enables the producer to name a price for coal delivered at destination, and introduces a new element of flexibility into the price circulars.

The Reading company has practically extended its transportation system to Boston, as it owns forty barges, besides several steam col-

liers and a number of powerful towboats, and, as it is also engaged in the mining business, it has absolute control of its coal until delivery is made on the dealer's wharf. The Pennsylvania Railroad owns no fleet, but operates a very important line of barges. This practical elimination of outside influences can not be said to have worked unfavorably to the trade, and it has certainly facilitated the operations of the railroad companies, since the efficiency of their car supply has been greatly increased by the steady supply of vessels, while the shipping expenses at the wharves have been slightly reduced.

The capacity of the barges now in service ranges from 1,400 to 3,600 tons, and one is about being completed that will carry 4,200 tons. This enormous hulk will accommodate the cargoes of two or three trains. In competition with such vessels, which are assured both of prompt loading at this port and prompt unloading at their destination, the individual vessel owner with a moderate-sized craft has little chance of success. Twenty years ago a 360-ton vessel was a marvel in the coal trade, but now a vessel with a capacity of less than 1,200 tons can not be made to pay expenses. While the vessel freight rates rose slightly in 1897, the improvement can only be temporary, as the coming season will see more large barges than ever before. With 27 feet of water in the Delaware River from the capes to Philadelphia, there is no reason to believe that 4,200 tons is the limit of vessel capacity, nor is there any reason why coal can not be carried from Philadelphia to Boston as cheaply as grain is carried from Chicago to Buffalo—that is, at from 30 cents to 40 cents per ton. This large barge business is of course confined to Boston and other important cities along the New England coast, and small sailing vessels are still employed for shipping to the smaller towns and to Southern points.

Through the courtesy of officers of the Pennsylvania Railroad Company, the Philadelphia and Reading Railway Company, and the Baltimore and Ohio Railroad Company, the data have been furnished from which the following table has been compiled, showing the distribution of coal at Philadelphia for the export trade, the coastwise and harbor trade, and the Philadelphia local trade. The figures for 1896 are also given for the purpose of comparison.

*Distribution of coal at Philadelphia in 1896 and 1897.*

[In tons of 2,240 pounds.]

| | 1896. | | 1897. | |
|---|---|---|---|---|
| | Anthracite. | Bituminous. | Anthracite. | Bituminous. |
| Export | 19,181 | 315,555 | 23,898 | 378,092 |
| Coastwise and harbor | 1,770,000 | 2,320,000 | 1,600,000 | 2,630,000 |
| Local | 3,500,000 | 935,000 | 3,570,000 | 1,600,000 |
| Total | 5,289,181 | 3,570,555 | 5,193,898 | 4,608,092 |

## PITTSBURG, PENNSYLVANIA.

While the city of Pittsburg and its vicinity constitute the most important center of trade in the bituminous coal industry, there is no local bureau devoted to the collection and dissemination of information regarding the volume of business transacted. The statistics presented herewith have been collected independently by the Survey for this report, and the writer desires to make special acknowledgment to the following officials for the courtesy extended in furnishing the information: Mr. W. H. Joyce, freight traffic manager Pennsylvania Railroad; Mr. W. L. Andrews, assistant coal and coke agent Baltimore and Ohio Railroad at Pittsburg; Mr. James Means, division freight agent Pittsburg, Cincinnati, Chicago, and St. Louis Railroad, Pittsburg; Mr. Edwin P. Bates, general freight agent Allegheny Valley Railway; Maj. W. H. Bixby, corps of engineers, United States Army, in charge of the Monongahela River slack-water improvements.

From the reports received from these gentlemen the following statement is compiled of the movement of coal at Pittsburg in 1896 and 1897:

*Shipments of coal to and through Pittsburg in 1896 and 1897.*

| | 1896. | 1897. | 1897. | | | |
|---|---|---|---|---|---|---|
| | | | Increase. | | Decrease. | |
| | | | Amount. | Per cent. | Amount. | Per cent. |
| Pennsylvania R. R.: | *Tons.* | *Tons.* | *Tons.* | | *Tons.* | |
| To Pittsburg | 346,541 | 372,763 | 26,222 | 7.57 | ..... | ..... |
| To Pittsburg Division, except Pittsburg | 585,197 | 649,631 | 64,434 | 11.01 | ..... | ..... |
| To Monongahela Division, except Pittsburg | 294,867 | 230,579 | ..... | ..... | 64,288 | 21.80 |
| To West Penn Division | 118,080 | 126,745 | 8,665 | 7.34 | ..... | ..... |
| To west of Pittsburg | 688,740 | 1,206,598 | 517,858 | 75.19 | ..... | ..... |
| Baltimore and Ohio R. R.: | | | | | | |
| To Pittsburg district | 552,031 | 395,265 | ..... | ..... | 156,766 | 28.4 |
| To west of Pittsburg | 839,145 | 581,851 | ..... | ..... | 257,294 | 30.66 |
| Pittsburg, Cincinnati, Chicago and St. Louis Rwy. *a* | 2,585,547 | 2,369,022 | ..... | ..... | 216,525 | 8.37 |
| Allegheny Valley Rwy.: *b* | | | | | | |
| To Pittsburg | 102,945 | 125,445 | ..... | ..... | 37,500 | 23.01 |
| To west of Pittsburg | 64,887 | 20,721 | ..... | ..... | 44,166 | 68 |
| Monongahela River docks: | | | | | | |
| To Pittsburg | 1,607,062 | 2,619,469 | 1,012,407 | 63 | ..... | ..... |
| To west of Pittsburg | 4,102,190 | 2,670,369 | ..... | ..... | 1,431,821 | 34.9 |
| Total to Pittsburg and vicinity *a* | 4,700,942 | 5,719,897 | 1,018,955 | 21.67 | ..... | ..... |
| Total west of Pittsburg | 7,246,290 | 5,648,561 | ..... | ..... | 1,597,729 | 22.05 |
| Total shipments | 11,947,232 | 11,368,458 | ..... | ..... | 578,774 | 4.85 |

*a* Shipments over the Pittsburg, Cincinnati, Chicago and St. Louis Railway are separated in the same ratio as the totals of other lines. Total shipments only over this line were reported.

*b* Coal originating on this road only. Does not include coal received from the Pennsylvania Railroad and forwarded over the Allegheny Valley Railway.

The above table brings out distinctly the effects of three conditions upon the coal trade of the Pittsburg district in 1897, as compared with 1896. These were, (1) the miners' strike, from July to September; (2) low water in the Ohio River in the summer of 1897; and (3) the revival in the manufacture of iron and steel. The effects of the miners' strike is seen in the decrease of 578,774 tons in the total movement of 1897, as compared with 1896. This difference would have been much larger but for the receipts of coal via the Pennsylvania Railroad and the Monongahela River, from points beyond the limits to which the strike extended. This coal received over the Pennsylvania lines went west of Pittsburg, while there was an increase of over 1,000,000 tons of river coal consumed in Pittsburg and vicinity.

The amount of coal passing through the Davis Island dam in 1897 was 1,431,821 tons less than in 1896. Most of this decrease was due to low water in the Ohio River during 1897, though a portion of the loss was doubtless due to increased consumption in and around Pittsburg. The increased activity in the iron and steel trade is reflected in an increase of more than 1,000,000 tons in the local consumption. Shipments of coal over the Pennsylvania Railroad to its Pittsburg, Monongahela, and West Penn divisions are included in the consumption of the Pittsburg district.

## MONONGAHELA RIVER SHIPMENTS.

Maj. W. H. Bixby, Corps of Engineers, U. S A., who has charge of the Government improvements on the Ohio and Monongahela rivers, has prepared for this report the following statement, showing the amount of coal which passed through the locks of the Monongahela River and Davis Island dam from 1890 to 1897. The difference between the amounts passing the locks and the amounts passing the dam may be considered the amount of river coal consumed at Pittsburg, and has been so taken in compiling the preceding table:

*Movements of coal through Monongahela River locks and Davis Island dam.*

| Year. | Passed through locks on Monongahela River. | Passed Davis Island dam, Ohio River, near Pittsburg. (From annual reports, Ohio River improvement). | Difference, approximate consumption of river coal at Pittsburg. |
|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* |
| 1890 | 4,652,104 | 3,420,357 | 1,231,747 |
| 1891 | 4,276,588 | 2,893,752 | 1,382,836 |
| 1892 | 3,872,340 | 2,299,294 | 1,573,046 |
| 1893 | 3,860,072 | 2,364,401 | 1,495,671 |
| 1894 | 4,649,612 | 2,453,787 | 2,195,825 |
| 1895 | 4,183,596 | 2,393,873 | 1,789,723 |
| 1896 | 5,709,252 | 4,102,190 | 1,607,062 |
| 1897 | 5,289,838 | 2,670,369 | 2,619,469 |

About 250,000 tons of river coal are estimated to have been mined in 1897 on the Monongahela River and used in the pools where mined, and consequently are not included in the amount locked. A proportionate amount, considering the yearly tonnage, applies in the same way for the other years.

### RECEIPTS AND SHIPMENTS BY RAIL.

The following tables show the receipts and shipments of coal by railroads entering the Pittsburg district:

*Receipts of coal via Pennsylvania Railroad in 1896 and 1897.*

| To— | 1897. | 1896. | Difference. | Per cent. |
|---|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Pittsburg, town | 372,763 | 346,541 | *a* 26,222 | 7.57 |
| Pittsburg division, except Pittsburg | 649,631 | 585,197 | *a* 64,434 | 11.01 |
| Monongahela division, except Pittsburg | 230,579 | 294,867 | *b* 64,288 | 21.08 |
| West Penn division | 126,745 | 118,080 | *a* 8,665 | 7.34 |
| West of Pittsburg | 1,206,598 | 688,740 | *a* 517,858 | 75.19 |
| Total | 2,586,316 | 2,033,425 | *a* 552,891 | 27.19 |

*a* Increase. *b* Decrease.

*Shipments of coal and coke via Baltimore and Ohio Railroad to and through Pittsburg.*

| Year. | Pittsburg district. | | Via Pittsburg to all points. | |
|---|---|---|---|---|
| | Coal. | Coke. | Coal. | Coke. |
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| 1896 | 552,031 | 447,866 | 839,145 | 727,219 |
| 1897 | 395,265 | 487,745 | 581,851 | 1,020,430 |

*Shipments of coal via Allegheny Valley Railroad to and through Pittsburg.*

| Year. | Pittsburg district. | Via Pittsburg to all points. | Total. |
|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* |
| 1895 | 162,600 | 33,399 | 195,999 |
| 1896 | 162,945 | 64,887 | 227,832 |
| 1897 | 125,445 | 20,721 | 146,166 |

The shipments over the Allegheny Valley Railroad include only the amount of coal originating on the line of that road. The following

table shows the amount of coal and coke received from other lines and forwarded over the Allegheny Valley Railroad. The coke to Pittsburg yard came from Connellsville and was only handled in switching limits:

*Coal and coke received by Allegheny Valley Railroad from other lines and forwarded.*

| Year. | Pittsburg yard. | | Other points. | | Total. | |
|---|---|---|---|---|---|---|
| | Coal. | Coke. | Coal. | Coke. | Coal. | Coke. |
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| 1895..... | 308,207 | 275,457 | 112,825 | 50,118 | 421,032 | 325,575 |
| 1896..... | 278,299 | 267,481 | 80,747 | 28,335 | 359,046 | 295,816 |
| 1897..... | 387,867 | 317,547 | 171,603 | 64,904 | 559,470 | 382,451 |

*Shipments of coal over the Pittsburg, Cincinnati, Chicago and St. Louis Railroad.*

| Year. | Tons. |
|---|---|
| 1895..... | 2,417,096 |
| 1896..... | 2,585,547 |
| 1897..... | 2,369,022 |

## BUFFALO, NEW YORK.[1]

The anthracite coal tonnage passing through Buffalo via water and rail in 1897 was 10 per cent less than that in 1896, and was the smallest amount handled in ten years. There was also a falling off in the receipts of bituminous coal, but the decrease was less marked than that of the anthracite tonnage. In fact, the falling off in the bituminous trade is remarkable for being so slight, for during the miners' strike in the bituminous regions Buffalo was almost entirely shut off from supply, and in several instances the closing down of manufacturing plants was necessary.

[1] From the annual report of the Buffalo Merchants' Exchange.

*Lake shipments of bituminous and Blossburg coal from Buffalo.*

| Year. | Bituminous. | Blossburg. |
|---|---|---|
| | *Tons.* | *Tons.* |
| 1887 | 8,706 | 10,000 |
| 1888 | 7,452 | 5,000 |
| 1889 | 11,673 | 5,000 |
| 1890 | 25,872 | 5,000 |
| 1891 | 34,066 | 5,000 |
| 1892 | 54,216 | 5,000 |
| 1893 | 15,000 | 7,500 |
| 1894 | 2,500 | 7,500 |
| 1895 | 2,000 | 6,000 |
| 1896 | 15,000 | 6,000 |
| 1897 | 100,000 | 5,000 |

*Shipments of bituminous coal by canal.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1890 | 25,872 | 1894 | 8,840 |
| 1891 | 34,060 | 1895 | 4,250 |
| 1892 | 29,216 | 1896 | 956 |
| 1893 | 19,336 | 1897 | *a* 164 |

*a* Anthracite.

*Anthracite wholesale circular prices at Buffalo in 1897.*

| Date. | Free on board vessels at Buffalo. | | | | On cars at Buffalo or Suspension Bridge. | | | |
|---|---|---|---|---|---|---|---|---|
| | Grate. | Egg. | Stove. | Chestnut. | Grate. | Egg. | Stove. | Chestnut. |
| January 1 | $5.05 | $5.30 | $5.30 | $5.30 | $4.75 | $5.00 | $5.00 | $5.00 |
| May 1 | 4.80 | 5.05 | 5.05 | 5.05 | 4.50 | 4.75 | 4.75 | 4.75 |
| July 1 to close of year. | 5.05 | 5.30 | 5.30 | 5.30 | 4.75 | 5.00 | 5.00 | 5.00 |

*Anthracite retail prices at Buffalo in 1897.*

| Date. | Grate. | Egg. | Stove. | Nut. | Pea. | Blossburg. |
|---|---|---|---|---|---|---|
| January 1 | $5.00 | $5.25 | $5.25 | $5.25 | $4.00 | $4.00 |
| May 1 | 4.75 | 5.00 | 5.00 | 5.00 | 3.75 | 4.00 |
| July 1 to close of year. | 5.00 | 5.25 | 5.25 | 5.25 | 4.00 | 4.00 |

## CLEVELAND, OHIO.

Mr. F. A. Scott, secretary of the transportation committee of the Cleveland Chamber of Commerce, furnishes the following history of the coal trade of that city:

The conditions which governed the Cleveland coal market during the year 1897 were varied and peculiar. From January 1 to July 1 prices ruled very low; in fact, taking into consideration the rate paid for mining in Ohio and competing States, they were unprecedented. The general miners' strike, which was inaugurated July 4, continued for nearly two and a half months. During this time mining was practically suspended in the States of Ohio, Indiana, and Illinois, the western part of Pennsylvania, and in some of the mining districts of West Virginia. As a result of the strike prices advanced very materially, but did not rule nearly so strong as during the strike of 1894. During the period of the strike of 1897 the Cleveland market was supplied with coal, in a moderate way, from the mines of eastern Pennsylvania, West Virginia, and Virginia. An agreement was reached September 11 between the miners and operators on a compromise basis, miners receiving 65 cents per ton instead of 69, as demanded. From the time of resumption of work to the end of the year prices were more favorable to the producer. The car supply was inadequate to the demand made upon the railways, thus in a measure regulating the output and assisting somewhat in maintaining prices. The supply of coal for the lake trade was not equal to the demand, the strike having been settled so late in the season as to leave but little time for lake shipment.

*Coal and coke receipts and shipments at Cleveland since 1887.*

| | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|
| **RECEIPTS.** | | | | |
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Bituminous | 1,454,744 | 1,737,781 | 1,600,000 | 1,560,208 |
| Anthracite | 176,769 | 181,551 | 160,000 | 205,856 |
| Coke | 114,924 | 124,827 | 150,000 | 194,527 |
| Total | 1,746,437 | 2,044,159 | 1,910,000 | 1,960,591 |
| **SHIPMENTS.** | | | | |
| Anthracite by rail | 20,296 | 29,735 | 25,000 | 29,056 |
| Bituminous by rail<br>Bituminous by lake | 703,506 | 1,000,000 | 1,100,000 | 1,200,000 |
| Total | 723,802 | 1,029,735 | 1,125,000 | 1,229,056 |

*Coal and coke receipts and shipments at Cleveland since 1837*—Continued.

| RECEIPTS. | | | | |
|---|---|---|---|---|
| | 1891. | 1892. | 1893. | 1894. |
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Bituminous | 2,838,586 | 3,651,080 | 3,603,984 | 2,715,540 |
| Anthracite | 201,927 | 259,150 | 262,266 | 207,604 |
| Coke | 189,640 | 351,527 | 235,248 | 298,061 |
| Total | 3,230,153 | 4,261,757 | 4,101,498 | 3,221,205 |
| SHIPMENTS. | | | | |
| Anthracite by rail | 34,910 | 50,742 | 49,497 | 44,177 |
| Bituminous by rail | 1,525,000 | 1,728,831 | 24,128 | 30,000 |
| Bituminous by lake | | | 1,257,326 | 1,106,000 |
| Coke by rail | | | | 42,048 |
| Total | 1,559,910 | 1,779,573 | 1,330,951 | 1,222,225 |

| RECEIPTS. | | | |
|---|---|---|---|
| | 1895. | 1896. | 1897. |
| | *Tons.* | *Tons.* | *Tons.* |
| Bituminous | 2,842,333 | 2,994,802 | 3,779,305 |
| Anthracite | 201,022 | 142,832 | 201,756 |
| Coke | 432,216 | 338,678 | 503,935 |
| Total | 3,475,571 | 3,476,312 | 4,484,996 |
| SHIPMENTS. | | | |
| Anthracite by rail | 31,894 | 20,299 | 33,750 |
| Bituminous by rail | 64,908 | 25,872 | 71,770 |
| Bituminous by lake | 1,125,624 | 1,803,709 | 2,027,693 |
| Coke by rail | 49,536 | 85,256 | 117,390 |
| Total | 1,271,962 | 1,935,136 | 2,250,603 |

The Cuyahoga customs district includes the ports of Cleveland, Ashtabula, Fairport, Lorain, and Conneaut. The following table shows the clearances from this district for the last eleven years:

*Clearances of coal from the Cuyahoga (Ohio) district for eleven years.*

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1887 | 1,433,035 | 1893 | 3,052,342 |
| 1888 | 1,855,260 | 1894 | 2,239,829 |
| 1889 | 2,020,996 | 1895 | 2,948,324 |
| 1890 | 2,328,663 | 1896 | 3,863,645 |
| 1891 | 2,635,461 | 1897 | 3,613,245 |
| 1892 | 2,957,988 | | |

The foregoing figures include only the coal actually rehandled, and do not include freight passing through Cleveland without transfer. Bituminous coal received via Ohio Canal at Cleveland, and amounting to 35,000 tons or more a year, is not included in the tables. Following are the average wholesale prices ruling at Cleveland in 1897:

*Wholesale prices of coal at Cleveland, Ohio, in 1897.*

| Kind. | Average price per ton. | Kind. | Average price per ton. |
|---|---|---|---|
| Bituminous: | | Bituminous—Continued. | |
| Massillon | $2.15 | Coshocton | $1.75 |
| Palmyra | 2.25 | Hocking | 1.80 |
| Pittsburg | 1.70 | Anthracite: | |
| Salineville | 1.40 | Grate | 4.68 |
| Kentucky cannel | 5.50 | Egg | 4.91 |
| Goshen | 1.50 | Stove | 4.91 |
| Sherodsville | 1.50 | Chestnut | 4.91 |
| Osnaburg | 1.50 | | |

## TOLEDO, OHIO.[1]

The coal receipts at Toledo in 1897 show a gratifying recovery from the depression of 1894 and the strikes of 1895. The increase in the receipts in 1897 over 1896 was more than 50,000 tons, and over 1895 about 1,048,000 tons.

Part of the increase is attributed to extended manufacturing enterprises and part is ascribed to improved harbor conditions, permitting the advent of larger steamers, and the consequent lower freights. Toledo is claimed to be a natural and ideal place for the meeting of

[1] Extract from the annual report of Mr. Denison B. Smith, secretary Produce Exchange.

iron ore and coal. Large sums are being expended yearly in improvements for the rapid handling of these commodities, and the harbor will soon be in condition to float, load, and unload ships of 6,000 tons burden. It is the nearest port to the upper lakes and will soon be one of the safest and most commodious harbors on Lake Erie.

The following tables give a summary of coal receipts at Toledo since 1886:

*Coal receipts at Toledo since 1886.*

| Railroad. | 1886. | 1887. | 1888. | 1889. |
|---|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Wabash R. R | 12,598 | 9,637 | 10,375 | 8,586 |
| Lake Shore and Michigan Southern Rwy | 165,382 | 206,099 | 201,064 | 35,693 |
| Cincinnati, Hamilton and Dayton R. R | 8,198 | 11,741 | 37,831 | 51,746 |
| Pennsylvania Co | 201,427 | 330,020 | 339,750 | 234,675 |
| Michigan Central R. R | 9,594 | 13,864 | 16,504 | 19,935 |
| Columbus, Hocking Valley and Toledo Rwy | 1,039,200 | 955,620 | 1,358,025 | 923,745 |
| Toledo, Ann Arbor and North Michigan Rwy | 1,910 | 552 | 24,700 | 96 |
| Toledo, St. Louis and Kansas City R. R | 3,828 | ..... | 1,359 | 3,287 |
| Toledo and Ohio Central Rwy | 404,684 | 590,000 | 637,000 | 706,950 |
| Lake | 87,120 | 117,921 | 140,963 | 90,282 |
| Wheeling and Lake Erie Rwy | 391,086 | 454,813 | 755,155 | 763,055 |
| Toledo, Columbus and Cincinnati Rwy | 15,832 | 5,446 | 2,014 | 2,210 |
| Cincinnati, Jackson and Mackinaw R. R | ..... | ..... | 45 | 54 |
| Total | 2,340,859 | 2,695,713 | 3,524,785 | 2,840,314 |

## CHICAGO, ILLINOIS.

The following tables show the receipts of coal at and shipments from Chicago during 1896 and 1897, as collected by the Chicago Bureau of Coal Statistics, room 601, Temple Court Building.

The anthracite coal receipts at Chicago during 1897, and as compared with 1896, are instructive as shown in the following table. The receipts by lake were 85,922 tons less than in 1896; receipts by rail show a decrease of 98,371 tons; while the total receipts are 184,293 tons less.

*Receipts of anthracite coal at Chicago in 1896 and 1897, by months.*

| Month. | Anthracite by lake. | | Anthracite by rail. | |
|---|---|---|---|---|
| | 1897. | 1896. | 1897. | 1896. |
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| January | ..... | ..... | 51,649 | 54,121 |
| February | ..... | ..... | 35,752 | 24,933 |
| March | ..... | ..... | 26,294 | 23,682 |
| April | 2,300 | 5,826 | 14,161 | 14,999 |
| May | 105,405 | 141,858 | 13,147 | 11,251 |
| June | 131,253 | 185,839 | 35,179 | 39,641 |
| July | 85,132 | 104,746 | 38,186 | 68,790 |
| August | 153,949 | 135,537 | 65,512 | 60,003 |
| September | 96,830 | 175,565 | 56,942 | 78,281 |
| October | 227,491 | 175,403 | 62,727 | 99,144 |
| November | 263,945 | 224,553 | 90,775 | 101,969 |
| December | 167,466 | 170,366 | 52,305 | 64,186 |
| Total | 1,233,771 | 1,319,693 | 542,629 | 641,000 |

| Month. | Total anthracite. | | 1897. | |
|---|---|---|---|---|
| | 1897. | 1896. | Increase. | Decrease. |
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| January | 51,649 | 54,121 | ..... | 2,472 |
| February | 35,752 | 24,933 | 10,819 | ..... |
| March | 26,294 | 23,682 | 2,612 | ..... |
| April | 16,461 | 20,825 | ..... | 4,364 |
| May | 118,552 | 153,109 | ..... | 34,557 |
| June | 166,432 | 225,480 | ..... | 59,048 |
| July | 123,318 | 173,536 | ..... | 50,218 |
| August | 219,461 | 195,540 | 23,921 | ..... |
| September | 153,772 | 253,846 | ..... | 100,074 |
| October | 290,218 | 274,547 | 15,671 | ..... |
| November | 354,720 | 326,522 | 28,198 | ..... |
| December | 219,771 | 234,552 | ..... | 14,781 |
| Total | 1,776,400 | 1,960,693 | ..... | 184,293 |

decrease in the supply from all sources for the year of 31,987 tons. The arrivals by lake of hard and soft coal together exceeded the total arrivals of the preceding season by 6,045 tons. During the last two months of navigation lake freights on coal advanced from 20 to 60 cents per ton to all upper lake ports under the congested state of business that succeeded the strike.

Compared with the two preceding years, the respective quantities of hard and soft coal received at Milwaukee were as follows:

*Receipts of coal at Milwaukee, Wisconsin, in 1895, 1896, and 1897.*

| Kind. | 1895. | 1896. | 1897. |
|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* |
| Hard coal | 853,680 | 813,487 | 645,432 |
| Soft coal | 592,743 | 774,308 | 910,376 |
| Total | 1,446,423 | 1,587,795 | 1,555,808 |

The following table will show the lake ports from which the supplies of coal were entered at the Milwaukee custom-house during each of the past thirteen years:

*Receipts of coal at Milwaukee for thirteen years.*

| | 1885. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|---|---|
| By lake from— | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Buffalo | 392,003 | 395,971 | 464,972 | 631,263 | 542,167 | 510,598 | 659,388 |
| Erie | 50,915 | 41,847 | 61,222 | 74,610 | 47,862 | 46,378 | 55,202 |
| Oswego | 10,043 | ..... | 1,153 | 1,348 | ..... | 2,408 | 17,022 |
| Cleveland | 126,741 | 91,997 | 78,259 | 98,631 | 89,071 | 135,413 | 143,776 |
| Ashtabula | 35,360 | 11,096 | 38,881 | 23,105 | 48,599 | 24,671 | 22,726 |
| Black River | 5,549 | ..... | ..... | ..... | ..... | ..... | ..... |
| Lorain | 19,452 | 12,417 | 11,757 | 13,533 | 15,367 | 15,351 | 3,983 |
| Sandusky | 19,307 | 57,412 | 46,606 | 19,733 | 51,816 | 26,133 | 10,692 |
| Toledo | 31,875 | 69,079 | 14,115 | 38,452 | 71,516 | 59,305 | 53,644 |
| Charlotte | 19,491 | 31,744 | 2,781 | 14,292 | 22,526 | 6,120 | 10,013 |
| Fairport | ..... | ..... | 10,517 | 30,253 | 5,552 | 11,100 | 5,775 |
| Ogdensburg | ..... | ..... | ..... | 7,700 | 4,953 | 7,026 | 5,179 |
| Huron, Ohio | ..... | ..... | ..... | 8,244 | 7,726 | 9,720 | 12,307 |
| Other ports | ..... | 2,679 | 4,331 | ..... | 588 | a49,375 | a6,949 |
| Total, lake | 710,736 | 714,242 | 724,594 | 961,164 | 907,743 | 903,658 | 1,006,656 |
| By railroad | 65,014 | 45,439 | 118,385 | 161,079 | 72,935 | 92,999 | 149,377 |
| Receipts | 775,750 | 759,681 | 842,979 | 1,122,243 | 980,678 | 996,657 | 1,156,033 |

a Including cargoes from all ports not reported at the custom-house.

*Receipts of coal at Milwaukee for thirteen years*—Continued.

| | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| By lake from— | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Buffalo | 819,570 | 629,243 | 658,978 | 755,831 | 745,870 | 545,219 |
| Erie | 65,190 | 78,947 | 97,995 | 86,332 | 19,879 | 92,370 |
| Oswego | 26,177 | 46,065 | 41,891 | 33,364 | 60,309 | 38,319 |
| Cleveland | 132,051 | 189,539 | 105,800 | 105,469 | 232,689 | 305,435 |
| Ashtabula | 30,549 | 38,317 | 58,179 | 99,521 | 114,625 | 132,103 |
| Lorain | ..... | 18,406 | 22,552 | 27,017 | 40,460 | 13,887 |
| Sandusky | 19,039 | 5,360 | 7,250 | 5,179 | 28,238 | 42,555 |
| Toledo | 12,229 | 64,548 | 90,357 | 74,603 | 114,501 | 216,318 |
| Charlotte | 55,909 | 763 | ..... | 1,153 | ..... | ..... |
| Fairport | 5,359 | 16,483 | 122,573 | 126,955 | 97,532 | 44,621 |
| Ogdensburg | 18,134 | 1,635 | 2,065 | ..... | 2,800 | ..... |
| Huron, Ohio | 12,173 | 26,342 | 3,275 | 11,229 | 29,605 | 44,378 |
| Other ports | 19,485 | 1,800 | 18,395 | 9,950 | 975 | 18,323 |
| Total, lake | 1,210,865 | 1,117,448 | 1,229,310 | 1,336,603 | 1,487,483 | 1,493,528 |
| By railroad | 163,549 | 132,284 | 107,736 | 109,920 | 100,312 | 62,280 |
| Receipts | 1,374,414 | 1,249,732 | 1,337,046 | 1,446,423 | 1,587,795 | 1,555,808 |

Shipments of coal from Milwaukee by rail in 1897 were larger by 206,184 tons than in 1896. The following table will show the westward movement of coal from this point for a series of years and the roads by which it was carried:

*Shipments of coal from Milwaukee for fifteen years.*

| Shipped by— | 1883. | 1884. | 1885. | 1886. | 1887. |
|---|---|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Chicago, Milwaukee and St. Paul Rwy | 146,295 | 140,630 | 179,883 | 177,286 | 166,120 |
| Chicago and Northwestern Rwy | 41,746 | 37,314 | 56,591 | 70,420 | 79,258 |
| Wisconsin Central R. R | 6,725 | 7,469 | 8,943 | 11,745 | 18,953 |
| Milwaukee, Lake Shore and Western Rwy | 30,575 | 11,757 | 12,804 | 13,072 | 13,886 |
| Milwaukee and Northern R. R | 10,075 | 7,556 | 10,872 | 12,011 | 15,627 |
| Lake | 355 | 335 | 184 | 269 | 1,595 |
| Total | 235,771 | 205,061 | 269,277 | 284,803 | 295,439 |

*Shipments of coal from Milwaukee for fifteen years*—Continued.

| Shipped by— | 1888. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Chicago, Milwaukee and St. Paul Rwy | 283,269 | 258,281 | 378,090 | 406,455 | 252,168 |
| Chicago and Northwestern Rwy. | 107,193 | 97,207 | 103,279 | 114,847 | 163,063 |
| Wisconsin Central R. R. | 12,624 | 11,727 | 15,929 | 14,449 | 14,930 |
| Milwaukee, Lake Shore and Western Rwy | 16,146 | 25,413 | 5,884 | 7,998 | 11,041 |
| Milwaukee and Northern R. R. | 34,480 | 20,556 | 19,386 | 26,723 | 27,185 |
| Lake | 125 | 224 | 50 | 416 | 757 |
| Total | 453,837 | 413,408 | 522,618 | 600,888 | 469,144 |

| Shipped by— | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Chicago, Milwaukee and St. Paul Rwy | 321,960 | 246,620 | 398,053 | 264,650 | 362,751 |
| Chicago and Northwestern Rwy. | 199,457 | 167,753 | 221,357 | 169,409 | 247,979 |
| Wisconsin Central R. R. | 10,967 | 12,377 | 17,990 | 12,318 | 42,017 |
| Milwaukee, Lake Shore and Western Rwy. *a* | ..... | ..... | ..... | ..... | ..... |
| Milwaukee and Northern R. R. *b* | ..... | ..... | ..... | ..... | ..... |
| Lake | 609 | 6,018 | 3,070 | 306 | 120 |
| Total | 532,993 | 432,768 | 640,470 | 446,683 | 652,867 |

*a* Absorbed by Chicago and Northwestern in 1893.
*b* Absorbed by Chicago, Milwaukee and St. Paul.

*Receipts of coal at Milwaukee by lake and rail annually from 1862 to 1897, inclusive.*

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1862 | 21,860 | 1880 | 368,568 |
| 1863 | 43,215 | 1881 | 550,027 |
| 1864 | 44,503 | 1882 | 593,842 |
| 1865 | 36,369 | 1883 | 612,584 |
| 1866 | 66,616 | 1884 | 704,166 |
| 1867 | 74,568 | 1885 | 775,750 |
| 1868 | 92,992 | 1886 | 759,681 |
| 1869 | 87,690 | 1887 | 842,979 |
| 1870 | 122,865 | 1888 | 1,122,243 |
| 1871 | 175,526 | 1889 | 980,678 |
| 1872 | 210,194 | 1890 | 996,657 |
| 1873 | 229,784 | 1891 | 1,156,033 |
| 1874 | 177,655 | 1892 | 1,374,414 |
| 1875 | 228,674 | 1893 | 1,249,732 |
| 1876 | 188,444 | 1894 | 1,337,046 |
| 1877 | 264,784 | 1895 | 1,446,423 |
| 1878 | 239,667 | 1896 | 1,587,795 |
| 1879 | 350,840 | 1897 | 1,555,808 |

*Coal receipts at Superior, Wisconsin, for eleven years.*

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1887 | 266,289 | 1893 | 1,196,919 |
| 1888 | 786,000 | 1894 | 1,456,400 |
| 1889 | 720,000 | 1895 | 1,371,340 |
| 1890 | 875,000 | 1896 | 1,440,000 |
| 1891 | 1,082,063 | 1897 | 1,471,200 |
| 1892 | 1,139,227 | | |

## CINCINNATI, OHIO.

The Survey is indebted to Mr. Charles B. Murray, superintendent of the Chamber of Commerce, for the statement of coal receipts at Cincinnati since 1891. Statistics for previous years were furnished by the former superintendent, Col. S. D. Maxwell. Prior to 1892 the statistics in the following table were collected for fiscal years ending August 31. The figures since 1892 are for calendar years. The receipts in 1891 from September 1 to December 31 are stated separately.

*Receipts of coal at Cincinnati since September 1, 1871.*

| Year. | Pittsburg (Youghiogheny). | Kanawha. | Ohio River. | Canal. |
|---|---|---|---|---|
| | *Bushels.* | *Bushels.* | *Bushels.* | *Bushels.* |
| 1871–72 | 19,254,716 | ..... | *a* 10,359,906 | 1,104,003 |
| 1872–73 | 24,962,373 | ..... | *a* 11,075,072 | 1,162,052 |
| 1873–74 | 24,014,681 | ..... | *a* 10,398,153 | 710,000 |
| 1874–75 | 24,225,002 | 4,476,619 | 4,277,327 | 565,352 |
| 1875–76 | 27,017,592 | 6,004,675 | 4,400,792 | 409,358 |
| 1876–77 | 28,237,572 | 3,631,823 | 5,141,150 | 322,171 |
| 1877–78 | 26,743,055 | 6,386,623 | 3,288,008 | 380,768 |
| 1878–79 | 20,769,027 | 6,134,039 | 4,068,452 | 333,549 |
| 1879–80 | 31,750,968 | 8,912,801 | 4,268,214 | 202,489 |
| 1880–81 | 23,202,084 | 10,715,459 | 3,151,934 | 67,684 |
| 1881–82 | 37,807,961 | 13,950,802 | 3,560,881 | 77,336 |
| 1882–83 | 33,895,064 | 13,260,347 | 3,309,534 | 180,621 |
| 1883–84 | 32,239,473 | 15,926,743 | 2,956,688 | 293,010 |
| 1884–85 | 32,286,133 | 14,588,573 | 3,007,078 | 314,774 |
| 1885–86 | 34,933,542 | 17,329,349 | 939,746 | 205,717 |
| 1886–87 | 37,701,094 | 20,167,875 | 338,435 | 129,503 |
| 1887–88 | 41,180,713 | 20,926,596 | 1,533,358 | 26,098 |
| 1888–89 | 36,677,974 | 23,761,853 | 544,940 | 12,129 |
| 1889–90 | 42,601,615 | 19,221,196 | 454,385 | ..... |
| 1890–91 | 43,254,460 | 19,115,172 | 1,479,670 | 15,111 |

*a* Including Kanawha coal.

*Receipts of coal at Cincinnati since September 1, 1871*—Continued.

| Year. | Pittsburg (Youghiogheny). | Kanawha. | Ohio River. | Canal. |
|---|---|---|---|---|
| | *Bushels.* | *Bushels.* | *Bushels.* | *Bushels.* |
| 1891, 4 months | 13,766,390 | 6,288,442 | 234,940 | ..... |
| 1892 *a* | 42,272,348 | 19,214,704 | 768,588 | ..... |
| 1893 | 28,643,562 | 24,971,261 | 405,202 | ..... |
| 1894 | 40,156,667 | 16,398,039 | 158,334 | ..... |
| 1895 | 26,675,823 | 15,106,095 | 14,400 | ..... |
| 1896 | 36,696,759 | 22,015,133 | 130,217 | ..... |
| 1897 | 35,040,790 | 17,941,769 | 60,217 | ..... |

| Year. | Anthracite. | Other kinds. | Total. |
|---|---|---|---|
| | *Bushels.* | *Bushels.* | *Bushels.* |
| 1871–72 | 72,171 | ..... | 30,790,796 |
| 1872–73 | 75,000 | ..... | 37,274,497 |
| 1873–74 | 112,000 | ..... | 35,234,834 |
| 1874–75 | 248,750 | 1,597,260 | 35,390,310 |
| 1875–76 | 282,578 | 2,068,322 | 40,183,317 |
| 1876–77 | 376,125 | 1,913,793 | 39,622,634 |
| 1877–78 | 439,350 | 1,654,425 | 38,892,229 |
| 1878–79 | 768,750 | 2,136,850 | 34,210,667 |
| 1879–80 | 712,075 | 2,351,699 | 48,198,246 |
| 1880–81 | 770,525 | 2,336,752 | 40,244,438 |
| 1881–82 | 779,925 | 3,090,715 | 59,267,620 |
| 1882–83 | 977,250 | 2,997,216 | 54,620,032 |
| 1883–84 | 1,085,350 | 3,910,795 | 56,412,059 |
| 1884–85 | 1,257,900 | 2,683,864 | 54,138,322 |
| 1885–86 | 1,287,925 | 2,720,250 | 57,416,529 |
| 1886–87 | 1,314,775 | 3,693,850 | 63,345,532 |
| 1887–88 | 1,328,225 | 5,710,649 | 70,705,639 |
| 1888–89 | 1,020,525 | 3,075,000 | 65,092,421 |
| 1889–90 | 1,001,175 | 4,709,775 | 67,988,146 |
| 1890–91 | 1,118,671 | 7,362,698 | 72,345,782 |
| 1891, 4 months | 402,528 | 4,437,139 | 25,129,439 |
| 1892 *a* | 1,268,170 | 13,335,006 | 76,858,816 |
| 1893 | 759,626 | 25,832,374 | 80,612,025 |
| 1894 | 661,548 | 19,083,527 | 76,458,115 |
| 1895 | 1,227,000 | 27,119,823 | 70,143,141 |
| 1896 | 1,171,000 | 19,676,000 | 79,689,109 |
| 1897 | 1,251,250 | 24,468,000 | 78,762,026 |

*a* Calendar years since 1892.

Receipts of coal at Cincinnati during the past seventeen years have been as follows:

*Coal receipts at Cincinnati, Ohio.*

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1881 | 1,492,817 | 1890 | 2,452,253 |
| 1882 | 2,197,407 | 1891 | 2,608,923 |
| 1883 | 2,025,859 | 1892 | 2,718,809 |
| 1884 | 2,092,551 | 1893 | 2,905,071 |
| 1885 | 2,008,850 | 1894 | 2,755,137 |
| 1886 | 2,130,354 | 1895 | 2,530,061 |
| 1887 | 2,350,026 | 1896 | 2,873,492 |
| 1888 | 2,551,415 | 1897 | 2,840,437 |
| 1889 | 2,348,055 | | |

The records of arrivals of coal at Cincinnati in 1897 show a reduction of about 1,000,000 bushels, or 1¼ per cent, in comparison with the large movement of the preceding year. From that year there was a surplus, with which and the current receipts free offerings were maintained, even under a curtailment in the river movement. The situation in September subsequently admitted of a strengthening of prices on local deliveries, so that the average for the three months, September to November, inclusive, was decidedly higher than for the first six months of the year, when the average was exceptionally low, the earlier part of the year representing $2 per ton for standard lump, delivered to consumers within usual distances, while the average in the later period mentioned was about $2.80.

The aggregate receipts of coal at Cincinnati in 1897 were 78,762,026 bushels, or 2,840,437 tons. Of this quantity, 1,251,250 bushels represented anthracite and the remainder bituminous coal, chiefly from the Pittsburg and Kanawha districts. The total receipts in 1896 were 79,689,109 bushels, or 2,873,492 tons. For five years ending with 1896 the annual average was 76,752,000 bushels, or 2,767,000 tons. The shipments of coal in 1897 were 19,173,000 bushels; in 1896, 14,934,000; in 1895, 18,795,000; in 1894, 17,029,000; in 1893, 18,867,000 bushels. The local consumption in recent years has been about 60,000,000 bushels annually.

Of the total receipts of coal for the year the arrivals by water were 53,042,876 bushels and by rail 25,719,250 bushels. For the preceding year the river receipts were 58,841,892 bushels and the receipts by rail 20,847,000 bushels. The changes in the transportation channels represented have been largely due to variable conditions of river navigation, but partly to interruptions occasioned by mining disputes. The river receipts in 1897 embraced 35,040,790 bushels from the Pittsburg district and 17,941,769 bushels from the Kanawha district. The quantity by rail from the Kanawha regions and Virginia was approximately 18,000,000 bushels. This implies that what is termed Kanawha

The bulk of coal from the Kanawha, Virginia, and West Virginia regions sells at the same, or about the same, prices as are obtained for the product from the Pittsburg district.

The receipts of coke for the year were 3,154,000 bushels and the quantity locally manufactured was 4,594,000 bushels, making a total of 7,748,000 bushels, compared with 6,916,000 bushels the preceding year. For city manufacture the average price for the year was 8 cents per bushel; of gas house, 8 cents; of Connellsville, $5.27 per ton.

## ST. LOUIS, MISSOURI.

Mr. James Cox, secretary of the Business Men's League of St. Louis, furnishes the following review of the coal trade of St. Louis during the year 1897:

The coal trade of St. Louis was materially interfered with by the labor troubles at the mines during the year 1897. There were several predictions of coal famine during the year, and at times the supply on hand ran very low indeed. Some dealers were unable to keep up with orders for domestic purposes, while others found it expedient to fill orders in part only. Much anxiety was felt among manufacturers. Business was unusually good, and factories generally worked heavier forces than in any previous years. A complete shut off in the supply of coal for steam-producing purposes would have been disastrous in the extreme, and to avoid the possibility of this the Manufacturers' Association appointed a commission and endeavored to adjust some of the most serious differences between the miners and the operators. Matters righted themselves before the worst fears were realized, but the strike and the tedious delays which followed its nominal adjustment had a marked effect on the receipts of coal.

The falling off in the receipts of soft coal amounted to nearly 4,000,000 bushels, or a little less than 3 per cent. The manufactured output of the city during 1897 was much larger than during 1896, and this accounts for the fact that the drop in receipts for the entire year was below that anticipated. There was also a decrease in the receipts of anthracite, although more coke was handled than in 1896.

A large proportion of the coal came, as usual, from the southern Illinois coal fields, whose proximity to St. Louis guarantees that city a liberal supply of coal for manufacturing purposes at very low prices. The strike caused a singular upheaval in railroad circles, as some mines were closed down much longer than others. The Baltimore and Ohio Railroad, which hauled nearly 12,000,000 bushels into St. Louis in 1896, and also in 1895, only delivered 8,000,000 bushels in 1897. The "Big Four" deliveries showed a falling off of 60 per cent. The Vandalia, Wabash, and Peoria and Northern railroads lost between them the hauling of 13,000,000 bushels. On the other hand, the Louisville, Evansville and St. Louis Railroad practically doubled its coal business to this point, and the Illinois Central scored a substantial gain. Coal

*Coal and coke receipts at St. Louis since 1890.*

| Year. | Soft coal. | Hard coal. | Coke. |
|---|---|---|---|
| | *Bushels.* | *Tons.* | *Bushels.* |
| 1890 | 69,477,225 | 124,335 | 9,919,850 |
| 1891 | 72,078,225 | 139,050 | 6,924,250 |
| 1892 | 82,302,228 | 187,327 | 8,914,400 |
| 1893 | 87,769,375 | 173,653 | 7,807,000 |
| 1894 | 74,644,375 | 186,494 | 6,365,900 |
| 1895 | 88,589,935 | 207,784 | 7,130,300 |
| 1896 | 87,677,600 | 218,955 | 5,395,900 |
| 1897 | 83,730,980 | 172,933 | 5,671,350 |

## MOBILE, ALABAMA.

Mr. Edward E. England, secretary of the chamber of commerce, estimates the receipts of coal at Mobile in 1897 at 176,760 tons, an increase of 8,760 tons over the previous year. Mr. England states that Mobile is expecting a large increase in the business of the port when the improvements of the waterway to the Alabama mines are completed. As it is, several barge loads, aggregating 3,000 tons, have already been received, the coal being loaded at the mines on the Tombigbee River, floated to Demopolis, and towed from there to Mobile. Three locks on the Warrior River have been completed. From this source of supply Mobile bunkers coal to vessels at $1.70 per ton—in bunkers and trimmed.

The receipts of coal at Mobile since 1883 are shown in the following table:

*Receipts of coal at Mobile, Alabama, since 1883.*

| Year. | Alabama coal. (a) | Anthracite and English. | Total. |
|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* |
| 1883 | 25,304 | 1,229 | 26,533 |
| 1884 | 17,808 | 891 | 18,699 |
| 1885 | 40,301 | 775 | 41,076 |
| 1886 | 30,310 | 2,022 | 32,332 |
| 1887 | 39,232 | 910 | 40,142 |
| 1888 | 38,785 | 648 | 39,433 |
| 1889 | 43,620 | 1,454 | 45,074 |
| 1890 | 39,320 | 1,327 | 40,647 |
| 1891 | 51,267 | 1,775 | 53,042 |
| 1892 | 70,298 | 1,500 | 71,798 |
| 1893 | 90,000 | 4,130 | 94,130 |
| 1894 | 104,340 | 3,600 | 107,940 |
| 1895 | 156,996 | 4,200 | 161,196 |
| 1896 | 165,000 | 3,000 | 168,000 |
| 1897 | b175,160 | 1,600 | 176,760 |

*a* This does not include the amount of coal used by the railroads on their locomotives and at their shops.
*b* Includes 3,000 tons received by barges via Tombigbee River.

## NORFOLK, VIRGINIA.

Col. William Lamb, of the firm of William Lamb & Co., agents for Pocahontas coal at Norfolk, Virginia, makes the following comments on the coal trade of that city:

The coal trade at Lamberts Point was quiet in 1897, although shipments exceeded those of 1896. The competition of Canadian coal in New England and the fierce battle for trade with other domestic coal throughout the United States has depressed the trade generally, but the demand for Pocahontas coal has increased, as shown in the following table:

*Pocahontas coal shipments from Lamberts Point piers since 1890.*

| Year. | Foreign. | Bunkers. | Coastwise. | Local. | Total. |
|---|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| 1890..... | 37,723 | 102,755 | 941,019 | 71,010 | 1,152,507 |
| 1891..... | 27,997 | 135,112 | 1,215,028 | 90,606 | 1,468,743 |
| 1892..... | 25,653 | 129,627 | 1,400,984 | 98,034 | 1,654,298 |
| 1893..... | 34,969 | 125,688 | 1,512,931 | 100,453 | 1,774,041 |
| 1894..... | 44,328 | 105,382 | 1,810,480 | 96,841 | 2,057,031 |
| 1895..... | 34,174 | 75,714 | 1,430,144 | 100,442 | 1,640,474 |
| 1896..... | 41,600 | 99,867 | 1,433,069 | 96,929 | 1,671,465 |
| 1897..... | 44,103 | 104,966 | 1,473,710 | 115,079 | 1,737,858 |

## SAN FRANCISCO, CALIFORNIA.

Mr. J. W. Harrison makes the following report to the coal trade of San Francisco:

The fuel consumption of California in 1897 was about 7 per cent greater than in 1896, which shows that the former year was a fairly profitable one for some of our manufacturing branches. Consumers were favored with low-priced coal the first half of the year, but the Dingley tariff, which went into effect in July, caused an advance on all grades equal to the increase of the duty; this change cuts a small figure with housekeepers and small consumers, but it is seriously felt in those industries where fuel is the principal factor in their expense account. Coal freights from Australia and Great Britain ruled high for the latter months of 1897, thus aiding to sustain full figures, as the coast colliery managers regulate their scale of prices by the import cost of colonial and English coal; hence the year has proved a very profitable one for our northern coal fields. It is a question as to how the local coal market will shape itself in 1898; there is no doubt as to the ability of British Columbia and Washington to fully supply us with all the fuel needed, in case foreign shipments should diminish, but there are indications of probable labor troubles when the Klondyke exodus

commences, and the writer predicts that all grades of laborers will catch the fever. Even if no trouble emanates from that source, there will certainly be a sparsity of vessels for transporting coal, as they will assuredly drift into the more profitable business of carrying freight and passengers toward the Alaskan gold fields. It is true this will last only for a few months, but it will be of sufficient duration materially to affect fuel values within that brief period.

The following table of prices will show the monthly fluctuations of foreign coals for "spot" cargoes. The average price is given for each month:

*Prices of coal at San Francisco, by months.*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australian (gas) | $5.25 | $5.25 | $5.15 | $5.10 | $5.15 | $5.20 | $5.25 | $5.50 | $5.75 | $6.00 | $6.10 | $6.10 |
| English steam. | 6.35 | 6.25 | 6.25 | 6.00 | 6.25 | 6.25 | 6.25 | 6.50 | 6.75 | 6.75 | 6.75 | 6.75 |
| Scotch splint.. | 6.50 | 6.50 | 6.25 | 6.25 | 6.25 | 6.25 | 6.50 | 6.75 | 7.00 | 7.00 | 7.00 | 7.00 |
| West Hartley . | 7.00 | 7.00 | 6.75 | 6.75 | 6.75 | 7.00 | 7.00 | 7.25 | 7.25 | 7.25 | 7.25 | 7.25 |

The various sources from which we have derived our supplies are as follows:

*Sources of coal consumed in California.*

| Source. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| British Columbia | 441,759 | 652,657 | 554,600 | 588,527 |
| Australia | 194,725 | 321,197 | 314,280 | 202,017 |
| English and Welsh | 35,662 | 168,586 | 210,660 | 151,269 |
| Scotch | 1,610 | 31,840 | 24,900 | 18,809 |
| Eastern (Cumberland and anthracite) | 32,550 | 42,210 | 35,720 | 18,960 |
| Franklin, Green River, and Cedar River | 216,760 | 178,230 | 164,930 | 167,550 |
| Carbon Hill and South Prairie | 191,109 | 196,750 | 218,390 | 261,435 |
| Mount Diablo and Coos Bay | 74,210 | 90,684 | 66,150 | 63,460 |
| Japan, etc | 13,170 | 20,679 | 4,220 | 7,758 |
| Total | 1,204,555 | 1,702,833 | 1,593,850 | 1,479,785 |

an increase for the year of 48,369 tons, or over 11 per cent. To these receipts should be added the 6,910 tons received from mines outside of the county, which brings the total receipts of coal at Seattle to 480,382 tons. This, at the rate of $3 a ton, amounts to $1,441,146.

During the same period the exports of coal amounted to 295,180 tons, as against 194,771 tons the previous year, an increase of 100,409 tons, or about 52 per cent. This left 178,292 tons for local consumption, which was used by the manufacturers and families of the city and by the fleet of steamships, steamers, and tugs that sail from Seattle to all parts of Puget Sound, the coast, and many foreign ports. The significance of this local consumption can be better understood when it is known that more than two-thirds of the local fleet of steamers are wood burners, and that many of the mills and factories consume wood entirely. Yet the city is using 15,945 tons a month, or more than 524 tons every day of the year. Following are the receipts from King County mines, and the shipments:

*Receipts and exports of coal at Seattle, Washington, in 1897, by months.*

| Month. | Receipts. | Exports. |
|---|---|---|
| | *Tons.* | *Tons.* |
| January | 39,039 | 21,306 |
| February | 35,600 | 20,020 |
| March | 38,995 | 20,545 |
| April | 36,164 | 22,941 |
| May | 35,493 | 17,984 |
| June | 37,698 | 24,180 |
| July | 34,247 | 27,209 |
| August | 35,750 | 26,224 |
| September | 41,188 | 25,865 |
| October | 51,529 | 34,593 |
| November | 44,158 | 28,591 |
| December | 43,611 | 25,820 |
| Total, 1897 | 473,472 | 295,180 |
| Total, 1896 | 425,103 | 194,771 |
| Increase in 1897 | 48,369 | 100,409 |

The increase in the receipts and shipments of coal bids fair during 1898 to be considerably enhanced, as the demand for fuel for the Yukon and Alaska steamers will be very great, and the supply will have to come mainly from Seattle.

## PRODUCTION OF COAL BY STATES.

Among the thirty-two States and Territories in which coal is produced, Pennsylvania stands preeminent. The history of the coal mining industry since 1880, as recorded in the volumes of Mineral Resources, shows that in each year the combined output of anthracite and bituminous coal in Pennsylvania has exceeded 50 per cent of the total coal product of the United States. In the early days of coal mining, the Richmond basin held a comparatively important place, having an output in 1822 of 48,214 tons, whereas the production of anthracite coal in Pennsylvania in that year was only 3,720 tons, and the Pennsylvania bituminous fields were not then opened. In 1833, however, the production of Pennsylvania anthracite had increased to 487,749 tons, and the output from the Richmond basin was 142,587 tons. Since that time Pennsylvania has maintained her supremacy, and while the records of coal production are wanting for the intervening years, with the exception of Pennsylvania anthracite and Maryland "Cumberland" coal, there is no doubt that Pennsylvania's percentage of the product between 1833 and 1880 was more than it has been during the last eighteen years.

In 1880 Pennsylvania produced 65 per cent of the total; in 1881 63 per cent of the product was from this State, but at no time since has the proportion been so high as 60 per cent. The lowest was 52 per cent, in 1888, but this extreme has not been reached a second time. The average percentage contributed by Pennsylvania in eighteen years has been 55. Pennsylvania's total product in 1897 was over 3,000,000 short tons more than in 1896, but the percentage of the total fell off from 54 to 53, the decrease in percentage being due to larger proportionate increases in other States. In fact, the coal-producing record for the year 1897 was remarkable, in the fact that out of 32 States the output increased in 28 and decreased in but 4. In 3 out of the 4 the differences were slight, aggregating but little more than 60,000 tons loss. Ohio bore the brunt of the decrease with a loss of 678,260 short tons.

It is the opinion of many conversant with the coal-mining conditions that the maximum output of anthracite coal in Pennsylvania has about been reached. This state of affairs is not due to the exhaustion or limitation of the supply, but rather to the competition of other fuels—bituminous coal, coke, and gas. In the meantime bituminous coal production in other States, notably Illinois and West Virginia, is likely to continue to increase, and it is possible that the percentage product of Pennsylvania will fall off, but the close of the twentieth century will probably find that State still occupying first place in the rank of coal producers.

Illinois continues to occupy second place, with 10 per cent of the total output. West Virginia, in 1897, took firm hold of third place,

with 7 per cent of the total, and an output of more than 2,000,000 tons in excess of Ohio, which, though suffering a decrease of 678,260 tons in 1897, produced 6 per cent of the total, and had more than double the product of Alabama, the fifth in rank. It will be observed that all these five States are east of the Mississippi River. Iowa leads the States west of the Mississippi, supplanting Maryland for sixth place, and is the only one of the Western States producing as much as 2 per cent of the total. Iowa's percentage in 1897 was 2.3. Maryland yielded 2.2 per cent; Indiana, the eighth, contributed 2.07 per cent; Kentucky, the ninth, 1.8 per cent, and Colorado, the tenth, 1.7 per cent. Only two of the ten leading States, Iowa and Colorado, are west of the Mississippi River.

The details of the production in the various States are contained in the following pages:

## ALABAMA.

Total product in 1897, 5,893,770 short tons; spot value, $5,192,085.

Compared with 1896, the production of coal in Alabama during 1897 shows an increase of 145,073 short tons, or a little less than 3 per cent. The value of the product in 1897 was only $17,950, or about 0.3 per cent, in excess of that of 1896, the average price per ton having declined from 90 cents to 88 cents.

In the following tables the figures indicate that the coal used in the production of coke decreased over 600,000 tons. This large decrease is only apparent, however, for while the output of coke was less than in 1896, the amount made in 1897 was larger than the amount of coal used, according to the table. The seeming discrepancy is due to the fact that in several instances the coke ovens are located at some distance from the mines, and the coal sent to these ovens is reported among the shipments. The total amount of coke produced in Alabama in 1897 was 1,443,017 short tons, involving the consumption of 2,451,475 short tons of coal.

The amount of coal mined by machines in Alabama was reported for the first time in 1897, the machine-mined product being 294,384 short tons. The amount of machine-mined coal for this State was not reported in 1896, and it is accordingly impossible to make any comparisons. The statistics of men employed and average working time for the two years show that the tonnage per day per man in 1897 was 2.38, against 2.34 in 1896. The number of men employed increased from 9,894 in 1896 to 10,597 in 1897, a gain of 703, but the average working time fell off from 248 days to 233 days.

Alabama coal operators were almost free from labor troubles throughout 1897. There were only eight mines affected by strikes during the year, and these were of short duration. At the Belle Ellen mine of the Bessemer Land and Improvement Company, Bibb County, 200 men were on strike twenty-one days, from August 3 to August 25; 200 men at the Blossburg mine and 500 men at Brookside and Brazil

mines of the Sloss Iron and Steel Company, all in Jefferson County, were on strike twenty-one days, from July 1 to 21; at the Montevallo Coal and Mining Company, Shelby County, 25 men were on strike one day, December 15; at the Santee mine of the Helena Coal Company, Shelby County, 40 men were on strike five days, November 21 to 26; at the America mine of the American Coal and Coke Company, Walker County, 160 men were on strike eleven days in April, and 50 men employed by the Mountain Valley Coal and Coke Company, Walker County, were on strike seven days in November.

The details of production, by counties, in 1896 and 1897 are shown in the following tables:

*Coal product of Alabama in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bibb | 5 | 661,801 | 1,944 | 31,740 | 15,357 | 710,842 | $634,478 | $0.89 | 232 | 1,195 |
| Jefferson | 32 | 1,804,763 | 245,378 | 75,760 | 1,603,818 | 3,729,719 | 3,304,949 | .89 | 290 | 5,134 |
| St. Clair | 2 | 32,062 | 245 | 1,061 | ..... | 33,368 | 33,368 | 1.00 | 154 | 162 |
| Shelby | 5 | 50,633 | 2,060 | 230 | ..... | 52,923 | 92,669 | 1.75 | 139 | 302 |
| Tuscaloosa | 6 | 115,915 | 7,996 | 3,480 | 77,832 | 205,223 | 230,979 | 1.13 | 258 | 588 |
| Walker | 26 | 852,099 | 2,333 | 25,697 | 72,513 | 952,642 | 813,712 | .85 | 189 | 2,403 |
| Blount, Cullman, Etowah, Winston | 4 | 38,220 | 460 | 300 | ..... | 38,980 | 38,980 | 1.00 | 143 | 110 |
| Small mines | ..... | ..... | 25,000 | ..... | ..... | 25,000 | 25,000 | 1.00 | ..... | ..... |
| Total | 80 | 3,555,493 | 285,416 | 138,268 | 1,769,520 | 5,748,697 | 5,174,135 | .90 | 248 | 9,894 |

*Coal product of Alabama in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bibb | 5 | 637,230 | 1,950 | 21,165 | 10,732 | 671,077 | $622,566 | $0.93 | 183 | 1,425 |
| Blount, Etowah | 2 | 40,168 | 350 | ..... | ..... | 40,518 | 44,253 | 1.09 | 254 | 61 |
| Jefferson | 35 | 2,645,107 | 29,773 | 74,902 | 964,894 | 3,714,676 | 3,266,217 | .88 | 250 | 6,026 |
| St. Clair | 2 | 63,104 | 693 | 3,787 | ..... | 67,584 | 54,997 | .81 | 270 | 166 |
| Shelby | 7 | 68,131 | 270 | 2,650 | 13,622 | 84,673 | 127,137 | 1.50 | 179 | 376 |
| Tuscaloosa | 5 | 126,525 | 5,772 | 4,243 | 97,948 | 234,488 | 218,545 | .93 | 276 | 425 |
| Walker | 20 | 955,104 | 12,972 | 19,440 | 50,000 | 1,037,516 | 815,617 | .79 | 219 | 2,089 |
| Winston | 2 | 8,228 | 10 | ..... | ..... | 8,238 | 7,753 | .94 | 212 | 29 |
| Small mines | ..... | ..... | 35,000 | ..... | ..... | 35,000 | 35,000 | 1.00 | ..... | ..... |
| Total | 78 | 4,543,597 | 86,790 | 126,187 | 1,137,196 | 5,893,770 | 5,192,085 | .88 | 233 | 10,597 |

The following table shows the annual output of coal in the State since 1870, with the exception of 1871 and 1872, for which no statistics were obtained:

*Annual coal product of Alabama since 1870.*

| Year. | Short tons. | Value. | Average price per ton. | Average number of days worked. | Average number of employees. |
|---|---|---|---|---|---|
| 1870 | 13,200 | ..... | ..... | ..... | ..... |
| 1873 | 44,800 | ..... | ..... | ..... | ..... |
| 1874 | 50,400 | ..... | ..... | ..... | ..... |
| 1875 | 67,200 | ..... | ..... | ..... | ..... |
| 1876 | 112,000 | ..... | ..... | ..... | ..... |
| 1877 | 196,000 | ..... | ..... | ..... | ..... |
| 1878 | 224,000 | ..... | ..... | ..... | ..... |
| 1879 | 280,000 | ..... | ..... | ..... | ..... |
| 1880 | 380,800 | ..... | ..... | ..... | ..... |
| 1881 | 420,000 | ..... | ..... | ..... | ..... |
| 1882 | 896,000 | ..... | ..... | ..... | ..... |
| 1883 | 1,568,000 | ..... | ..... | ..... | ..... |
| 1884 | 2,240,000 | ..... | ..... | ..... | ..... |
| 1885 | 2,492,000 | ..... | ..... | ..... | ..... |
| 1886 | 1,800,000 | $2,574,000 | $1.43 | ..... | ..... |
| 1887 | 1,950,000 | 2,535,000 | 1.30 | ..... | ..... |
| 1888 | 2,900,000 | 3,335,000 | 1.15 | ..... | ..... |
| 1889 | 3,572,983 | 3,961,491 | 1.10 | 248 | 6,975 |
| 1890 | 4,090,409 | 4,202,469 | 1.03 | 217 | 10,642 |
| 1891 | 4,759,781 | 5,087,596 | 1.07 | 268 | 9,302 |
| 1892 | 5,529,312 | 5,788,898 | 1.05 | 271 | 10,075 |
| 1893 | 5,136,935 | 5,096,792 | .99 | 237 | 11,294 |
| 1894 | 4,397,178 | 4,085,535 | .93 | 238 | 10,859 |
| 1895 | 5,693,775 | 5,126,822 | .90 | 244 | 10,346 |
| 1896 | 5,748,697 | 5,174,135 | .90 | 248 | 9,894 |
| 1897 | 5,893,770 | 5,192,085 | .88 | 233 | 10,597 |

In the following table is shown the coal product in Alabama, by counties, for a period of eight years, with the increase or decrease in each county during 1897 as compared with 1896:

*Coal product of Alabama, by counties, since 1889.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Bibb | 500,525 | 221,811 | 619,809 | 793,469 | 806,214 |
| Blount | ..... | ..... | ..... | ..... | ..... |
| Dekalb | ..... | ..... | ..... | ..... | 40 |
| Etowah | ..... | ..... | ..... | ..... | ..... |
| Jackson | ..... | ..... | ..... | ..... | ..... |
| Jefferson | 2,437,446 | 2,665,060 | 2,905,343 | 3,399,274 | 3,093,277 |
| St. Clair | 40,557 | 33,653 | 66,096 | 24,950 | 72,000 |
| Shelby | 84,333 | 25,022 | 34,130 | 27,968 | 55,339 |
| Tuscaloosa | 16,141 | 65,517 | 142,184 | 168,039 | 167,516 |
| Walker | 488,226 | 767,346 | 980,219 | 1,103,612 | 927,349 |
| Winston | ..... | ..... | ..... | ..... | 3,200 |
| Small mines | 5,255 | 12,000 | 12,000 | 12,000 | 12,000 |
| Total | 3,572,983 | 4,090,409 | 4,759,781 | 5,529,312 | 5,136,935 |

| County. | 1894. | 1895. | 1896. | 1897. | Increase 1897. | Decrease 1897. |
|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Bibb | 401,061 | 653,732 | 710,842 | 671,077 | ..... | 39,765 |
| Blount | 8,000 | 62,400 | 32,760 | 37,350 | 4,590 | ..... |
| Cullman | ..... | ..... | 1,000 | ..... | ..... | 1,000 |
| Dekalb | ..... | ..... | ..... | ..... | ..... | ..... |
| Etowah | ..... | 900 | 3,080 | 3,168 | 88 | ..... |
| Jackson | 6,011 | ..... | ..... | ..... | ..... | ..... |
| Jefferson | 2,766,302 | 3,726,325 | 3,729,719 | 3,714,676 | ..... | 15,043 |
| St. Clair | 43,517 | 30,806 | 33,368 | 67,584 | 34,216 | ..... |
| Shelby | 76,619 | 52,754 | 52,923 | 84,673 | 31,750 | ..... |
| Tuscaloosa | 191,081 | 208,117 | 205,223 | 234,488 | 29,265 | ..... |
| Walker | 891,953 | 946,241 | 952,642 | 1,037,516 | 84,874 | ..... |
| Winston | 4,634 | 4,500 | 2,140 | 8,238 | 6,098 | ..... |
| Small mines | 8,000 | 8,000 | 25,000 | 35,000 | 10,000 | ..... |
| Total | 4,397,178 | 5,693,775 | 5,748,697 | 5,893,770 | *a* 145,073 | ..... |

*a* Net increase.

Previous to 1889 the statistics of coal production in Alabama did not show the value by counties nor the average prices. The following table exhibits the average price per ton realized in counties producing 10,000 tons in each year since 1889:

*Average prices for Alabama coal at the mines since 1889, by counties.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Bibb | $1.20 | $1.10 | $1.17 | $1.08 | $1.00 | $1.00 | $1.00 | $0.89 | $0.93 |
| Blount | ..... | ..... | ..... | ..... | ..... | ..... | .80 | 1.00 | 1.10 |
| Jefferson | 1.07 | 1.00 | 1.04 | 1.03 | .98 | .90 | .87 | .89 | .88 |
| St. Clair | 1.25 | 1.18 | 1.14 | 1.10 | 1.06 | .96 | .48 | 1.00 | .81 |
| Shelby | 1.79 | 2.50 | 2.60 | 2.61 | 1.82½ | 1.44 | 1.73 | 1.75 | 1.50 |
| Tuscaloosa | 1.23 | 1.05 | 1.03 | 1.07 | 1.05 | 1.06 | .97 | 1.13 | .93 |
| Walker | 1.04 | 1.00 | 1.03 | 1.02 | .98 | .91 | .90 | .85 | .79 |
| General average | 1.10 | 1.03 | 1.07 | 1.05 | .99 | .93 | .90 | .90 | .88 |

In the above table only those counties are considered whose annual product exceeds 10,000 tons. Instead of discussing each county by itself, the foregoing tables have been given as showing in compact form the essential matters of interest in regard to the product and value for a series of years. Similarly the following table shows the statistics of the number of men employed and the average working time in counties producing more than 10,000 tons in each year:

*Statistics of labor employed and working time at Alabama coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. |
| Bibb | 250 | 1,340 | 243 | 1,175 | 290 | 1,500 | 216 | 1,280 |
| Blount | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Jefferson | 267 | 6,209 | 274 | 5,405 | 289 | 5,860 | 258 | 7,033 |
| St. Clair | 250 | 1,340 | 242 | 180 | 200 | 75 | 198 | 135 |
| Shelby | 200 | 150 | 265 | 200 | 225 | 150 | 200 | 255 |
| Tuscaloosa | 157 | 268 | 287 | 298 | 261 | 281 | 247 | 412 |
| Walker | 210 | 1,500 | 219 | 2,044 | 217 | 2,209 | 187 | 2,158 |
| The State | 217 | 10,642 | 268 | 9,302 | 271 | 10,075 | 237 | 11,294 |

*Statistics of labor employed and working time at Alabama coal mines*—Continued.

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. |
| Bibb | 204 | 1,089 | 198 | 1,259 | 232 | 1,195 | 183 | 1,425 |
| Blount | ..... | ..... | 275 | 95 | 225 | 46 | 285 | 50 |
| Jefferson | 272 | 6,567 | 267 | 5,825 | 290 | 5,134 | 250 | 6,026 |
| St. Clair | 225 | 98 | 126 | 96 | 154 | 162 | 270 | 166 |
| Shelby | 114 | 405 | 169 | 198 | 139 | 302 | 179 | 376 |
| Tuscaloosa | 261 | 363 | 282 | 612 | 258 | 588 | 276 | 425 |
| Walker | 180 | 2,252 | 210 | 2,231 | 189 | 2,403 | 219 | 2,089 |
| The State | 238 | 10,859 | 244 | 10,346 | 248 | 9,894 | 233 | 10,597 |

## ALASKA.

Coal production in Alaska on a commercial scale began in 1896 with an output of 15,232 short tons, valued at $54,400. The product in 1897 amounted to 17,920 short tons, valued at $64,000, an increase of 2,688 tons in quantity and $9,600 in value. About three-fourths of the product is shipped from the mines, for use principally on steamers engaged in coastwise traffic. Practically all of the output is mined by machines, of which there were six in use in both years. The details of production in the two years are as follows:

*Coal product of Alaska in 1896 and 1897.*

| Year. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| 1896 | 1 | 11,200 | 3,360 | 672 | 15,232 | $54,400 | $3.57 | 245 | 20 |
| 1897 | 1 | 12,880 | 4,480 | 560 | 17,920 | 64,000 | 3.57 | 275 | 18 |

## ARKANSAS.

Total product in 1897, 856,190 short tons; spot value, $903,993.

Except for a decline of 6 cents per ton in the average price realized for the product, the coal-mining interests of Arkansas in 1897 were exceptionally favored. The product was the largest in the history of the State, exceeding that of 1896 by 180,816 short tons, or about 27 per cent. Compared with 1895, the product last year shows a gain of 43

per cent, and an increase of 67 per cent as compared with 1894. Notwithstanding the decline in price, the total value in 1897 was nearly $150,000 more than that received for the product of 1896. The decline in price was in part compensated for by an increase in machine-mined coal, which amounted to 87,532 short tons, or 10.3 per cent of the total product, in 1897, against 21,094 short tons, or 3.12 per cent of the total, in 1896. The tonnage per day per man increased from 2.66 in 1896 to 2.75 in 1897. The price per ton declined 5.4 per cent; the individual efficiency increased 3.4 per cent.

The Sebastian County mines of the Western Coal and Mining Company were the only ones at which a strike occurred in 1897. The men, 480 in all, at three mines in this county were on strike for one week in October, the strike, owing to its short duration, having no material effect upon the production.

In the following tables are shown the statistics of production in 1896 and 1897, by counties, with the distribution of the product for consumption:

*Coal product of Arkansas in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Franklin | 2 | 111,280 | 800 | 3,300 | 115,380 | $134,812 | $1.17 | 147 | 269 |
| Johnson, Pope | 3 | 103,281 | 750 | 3,300 | 107,331 | 160,854 | 1.48 | 156 | 285 |
| Sebastian | 9 | 432,679 | 1,090 | 12,894 | 446,663 | 447,911 | 1.00 | 180 | 953 |
| Small mines | ..... | ..... | 6,000 | ..... | 6,000 | 12,000 | 2.00 | ..... | ..... |
| Total | 14 | 647,240 | 8,640 | 19,494 | 675,374 | 755,577 | 1.12 | 168 | 1,507 |

*Coal product of Arkansas in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Franklin | 2 | 162,307 | 260 | 1,730 | 164,297 | $182,864 | $1.11 | 154 | 380 |
| Johnson, Pope | 3 | 107,752 | 4,250 | 6,000 | 117,002 | 178,082 | 1.52 | 131 | 405 |
| Sebastian | 9 | 557,459 | 1,078 | 10,354 | 568,891 | 531,047 | .93 | 165 | 1,205 |
| Small mines | ..... | ..... | 6,000 | ..... | 6,000 | 12,000 | 2.00 | ..... | ..... |
| Total | 14 | 827,518 | 11,588 | 18,084 | 856,190 | 903,993 | 1.06 | 156 | 1,990 |

According to the Tenth Census of the United States (1880) the coal output of Arkansas was 14,778 short tons, worth at the mines $33,535.

No statistics were obtained in 1881. Since 1882 the statistics of production, as far as has been ascertained, have been as follows:

*Annual production of coal in Arkansas since 1882.*

| Year. | Short tons. | Value. | Average price per ton. | Average number of days worked. | Average number of employees. |
|---|---|---|---|---|---|
| 1882 | 5,000 | ..... | ..... | ..... | ..... |
| 1883 | 50,000 | ..... | ..... | ..... | ..... |
| 1884 | 75,000 | ..... | ..... | ..... | ..... |
| 1885 | 100,000 | ..... | ..... | ..... | ..... |
| 1886 | 125,000 | $200,000 | $1.60 | ..... | ..... |
| 1887 | 129,600 | 194,400 | 1.50 | ..... | ..... |
| 1888 | 276,871 | 415,306 | 1.50 | ..... | 978 |
| 1889 | 279,584 | 395,836 | 1.42 | ..... | 677 |
| 1890 | 399,888 | 514,595 | 1.29 | 214 | 938 |
| 1891 | 542,379 | 647,560 | 1.19 | 214 | 1,317 |
| 1892 | 535,558 | 666,230 | 1.24 | 199 | 1,128 |
| 1893 | 574,763 | 773,347 | 1.34 | 151 | 1,559 |
| 1894 | 512,626 | 631,988 | 1.22 | 134 | 1,493 |
| 1895 | 598,322 | 751,156 | 1.25 | 176 | 1,218 |
| 1896 | 675,374 | 755,577 | 1.12 | 168 | 1,507 |
| 1897 | 856,190 | 903,993 | 1.06 | 156 | 1,990 |

In the following table is shown the annual product since 1887, by counties:

*Coal product of Arkansas since 1887, by counties.*

| County. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Johnson | 81,900 | 106,037 | 105,998 | 89,000 | 80,000 |
| Pope | 8,200 | 10,240 | 6,014 | 4,000 | 5,000 |
| Sebastian | 39,500 | 160,594 | 165,884 | 300,888 | 451,379 |
| Small mines | ..... | ..... | *a* 1,688 | 6,000 | 6,000 |
| Total | 129,600 | 276,871 | 279,584 | 399,888 | 542,379 |

| County. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Franklin | ..... | 9,879 | 147,728 | 252,938 | 222,711 | 281,299 |
| Johnson | 91,960 | 97,733 | | | | |
| Pope | 17,500 | 12,250 | 17,788 | | | |
| Sebastian | 420,098 | 448,901 | 341,110 | 339,384 | 446,663 | 568,891 |
| Small mines | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 |
| Total | 535,558 | 574,763 | 512,626 | 598,322 | 675,374 | 856,190 |

*a* Product of Franklin County according to Eleventh Census.

## CALIFORNIA.

Total product in 1897, 85,992 short tons; spot value, $201,236.

The coal production of California in 1897 exceeded that of any year since 1891. The increase is attributed to the increased duty on imported coal, the tariff of 1897 imposing 67 cents per ton, against 40 cents under the Wilson tariff. The increase in the average price per ton, from $2.12 in 1896 to $2.34 in 1897, is probably due to the same cause.

There were no strikes or other disturbing elements in the industry during 1897. All of the product is mined by hand, no machines having been introduced into California mines.

The following tables exhibit the details of production in 1896 and 1897:

*Coal product of California in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Contra Costa... | 2 | 48,008 | 1,398 | 3,599 | 53,005 | $128,209 | $2.42 | 301 | 122 |
| Amador..... | 2 | 21,600 | 3,139 | 800 | 25,539 | 37,914 | 1.48 | 284 | 35 |
| San Diego..... | | | | | | | | | |
| Total..... | 4 | 69,608 | 4,537 | 4,399 | 78,544 | 166,123 | 2.12 | 297 | 157 |

*Coal product of California in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Alameda..... | 2 | 33,900 | 2,000 | 1,000 | 36,900 | $77,870 | $2.11 | 67 | 212 |
| Amador..... | | | | | | | | | |
| Contra Costa... | 2 | 37,462 | 1,087 | 3,356 | 41,905 | 103,011 | 2.68 | 269 | 130 |
| Kern..... | 3 | 3,400 | 3,782 | 5 | 7,187 | 20,355 | 2.83 | 253 | 21 |
| Orange..... | | | | | | | | | |
| San Diego..... | | | | | | | | | |
| Total..... | 7 | 74,762 | 6,869 | 4,361 | 85,992 | 201,236 | 2.34 | 150 | 363 |

The following table shows the total output of California since 1883, with the value, when it has been reported, and the statistics of the number of employees and the average working time during the past eight years:

*Coal product of California since 1883.*

| Year. | Short tons. | Value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|
| 1883 | 76,162 | ..... | ..... | ..... | ..... |
| 1884 | 77,485 | ..... | ..... | ..... | ..... |
| 1885 | 71,615 | ..... | ..... | ..... | ..... |
| 1886 | 100,000 | $300,000 | $3.00 | ..... | ..... |
| 1887 | 50,000 | 150,000 | 3.00 | ..... | ..... |
| 1888 | 95,000 | 380,000 | 4.00 | ..... | ..... |
| 1889 | 121,820 | 288,232 | 2.36 | ..... | ..... |
| 1890 | 110,711 | 283,019 | 2.56 | 301 | 364 |
| 1891 | 93,301 | 204,902 | 2.20 | 222 | 256 |
| 1892 | 85,178 | 209,711 | 2.46 | 204 | 187 |
| 1893 | 72,603 | 167,555 | 2.31 | 208 | 158 |
| 1894 | 67,247 | 155,620 | 2.31 | 232 | 125 |
| 1895 | 75,453 | 175,778 | 2.33 | 262 | 190 |
| 1896 | 78,544 | 166,123 | 2.12 | 297 | 157 |
| 1897 | 85,992 | 201,236 | 2.34 | 150 | 363 |

## COLORADO.

Total product in 1897, 3,361,703 short tons; spot value, $3,947,186.

Although the output of coal in Colorado during 1897 was 249,303 short tons larger than the product of 1896, it did not reach the amount mined in 1891, 1892, or 1893. The latter year was the year of largest production, with a total output of 4,102,389 short tons, about 740,000 tons more than the yield in 1897. The product in both 1891 and 1892 was a little over 3,500,000 tons.

There was a slight increase in the use of mining machines in 1897. The number of machines used increased from 34 in 1896 to 37 in 1897, a gain of 3, while the amount of coal won by machines increased from 318,172 tons to 352,400 tons.

Three unimportant strikes occurred in 1897. The Longs Peak mine, in Boulder County, had 56 men out for eleven days; the Lister Coal Company, also in Boulder County, had 33 men idle for eleven days, and 14 men at the Champion Mine, in La Plata County, were on strike for six days.

The production, by counties, in 1896 and 1897 was as follows:

*Coal product of Colorado in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Boulder | 15 | 415,878 | 17,388 | 14,240 | 1,200 | 448,706 | $593,523 | $1.32 | 144 | 682 |
| Fremont | 9 | 269,930 | 7,456 | 17,436 | ..... | 294,822 | 464,615 | 1.58 | 110 | 1,407 |
| Garfield | 3 | 155,585 | 604 | 9,608 | ..... | 165,797 | 173,230 | 1.05 | 136 | 314 |
| Gunnison | 7 | 160,782 | 3,725 | 6,872 | 89,217 | 260,596 | 397,508 | 1.53 | 189 | 576 |
| Huerfano | 7 | 324,626 | 2,264 | 26,448 | ..... | 353,338 | 375,228 | 1.06 | 219 | 647 |
| La Plata | 8 | 86,768 | 10,826 | 448 | 6,619 | 104,661 | 154,475 | 1.46 | 215 | 179 |
| Las Animas | 10 | 929,822 | 9,927 | 15,621 | 306,185 | 1,261,555 | 1,185,113 | .94 | 192 | 2,578 |
| Mesa | 3 | 28,200 | 779 | ..... | ..... | 28,979 | 43,354 | 1.50 | 234 | 54 |
| Montezuma | 3 | ..... | 203 | ..... | ..... | 203 | 791 | 3.90 | 110 | 4 |
| Pitkin | 2 | 39,342 | 347 | 2,455 | 126,269 | 168,413 | 189,951 | 1.13 | 267 | 187 |
| Rio Blanco | 4 | ..... | 1,400 | ..... | ..... | 1,400 | 2,500 | 1.79 | 173 | 7 |
| Routt | 8 | 5,550 | 1,282 | ..... | ..... | 1,832 | 2,702 | 1.47 | 65 | 17 |
| Weld | 2 | ..... | 4,300 | ..... | ..... | 4,300 | 5,120 | 1.19 | 207 | 13 |
| Arapahoe, El Paso, Larimer | 3 | 12,544 | 1,398 | ..... | ..... | 13,942 | 13,298 | .95 | 177 | 23 |
| Delta, Montrose | 4 | ..... | 3,856 | ..... | ..... | 3,856 | 5,234 | 1.36 | 163 | 16 |
| Total | 88 | 2,424,027 | 65,755 | 93,128 | 529,490 | 3,112,400 | 3,606,642 | 1.16 | 172 | 6,704 |

*Coal product of Colorado in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Boulder | 18 | 441,417 | 16,573 | 19,800 | ..... | 477,790 | $619,122 | $1.29 | 164 | 805 |
| Delta | 3 | ..... | 5,262 | 500 | ..... | 5,765 | 8,397 | 1.46 | 208 | 23 |
| Fremont | 5 | 289,061 | 2,186 | 13,342 | ..... | 304,589 | 494,312 | 1.62 | 123 | 896 |
| Garfield | 6 | 173,512 | 1,276 | 8,096 | ..... | 182,884 | 203,912 | 1.12 | 241 | 216 |
| Gunnison | 6 | 173,252 | 2,037 | 7,206 | 114,922 | 297,417 | 438,908 | 1.48 | 165 | 692 |
| Huerfano | 11 | 333,676 | 3,797 | 30,421 | ..... | 367,894 | 432,773 | 1.18 | 150 | 724 |
| La Plata | 6 | 68,158 | 5,072 | 100 | 3,458 | 76,788 | 112,359 | 1.46 | 218 | 130 |
| Las Animas | 10 | 1,062,792 | 15,606 | 11,458 | 337,670 | 1,427,526 | 1,359,022 | .95 | 215 | 1,971 |
| Pitkin | 3 | 82,203 | 904 | 1,874 | 86,130 | 171,111 | 202,258 | 1.18 | 208 | 238 |
| Rio Blanco | 4 | ..... | 1,867 | 15 | ..... | 1,882 | 3,220 | 1.71 | 129 | 9 |
| Routt | 9 | 262 | 683 | ..... | ..... | 945 | 1,548 | 1.64 | 47 | 17 |
| Weld | 4 | 3,360 | 4,600 | 350 | ..... | 8,310 | 12,255 | 1.47 | 266 | 21 |
| Arapahoe, El Paso | 2 | 12,349 | 480 | 20 | ..... | 12,849 | 15,062 | 1.17 | 188 | 24 |
| Jefferson, Larimer | 5 | ..... | 14,845 | 600 | ..... | 15,445 | 27,940 | 1.81 | 201 | 39 |
| Mesa, Montrose, Montezuma | 5 | 9,000 | 1,508 | ..... | ..... | 10,508 | 16,098 | 1.53 | 167 | 47 |
| Total | 97 | 2,649,042 | 76,699 | 93,782 | 542,180 | 3,361,703 | 3,947,186 | 1.17 | 180 | 5,852 |

In the table below is shown the total product of the State, by counties, since 1887, with the increases and decreases in 1897 as compared with 1896.

*Coal product of Colorado since 1887, by counties.*

[Short tons.]

| County. | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|
| Arapahoe | 16,000 | 1,700 | 823 | 700 |
| Boulder | 297,338 | 315,155 | 323.096 | 425,704 |
| Dolores | 1,000 | 200 | ..... | 800 |
| El Paso | 47,517 | 44,114 | 54,212 | 25,617 |
| Fremont | 417,326 | 438,789 | 274,029 | 397,418 |
| Garfield | 30,000 | 115,000 | 239,292 | 183,884 |
| Gunnison | 243,122 | 258,374 | 252,442 | 229,212 |
| Huerfano | 131,810 | 159,610 | 333,717 | 427,132 |
| Jefferson | 12,000 | 9,000 | 10,790 | 10,984 |
| Las Animas | 506,540 | 706,455 | 993,534 | 1,154,668 |
| La Plata | 22,880 | 33,625 | 34,971 | 43,193 |
| Mesa | ..... | 300 | 1,100 | 1,000 |
| Park | 23,421 | 46,588 | 41,823 | 49,594 |
| Pitkin | 4,000 | 28,113 | ..... | 74,362 |
| Weld | 39,281 | 28,054 | 28,628 | 46,417 |
| Routt | ..... | ..... | 1,491 | 705 |
| Larimer | ..... | ..... | 100 | 1,500 |
| Douglas | 3,500 | 400 | 260 | 700 |
| San Miguel | ..... | ..... | 1,800 | 1,500 |
| Delta | ..... | ..... | 1,357 | 775 |
| Montezuma | ..... | ..... | 816 | 238 |
| Montrose | ..... | ..... | ..... | ..... |
| Rio Blanco | ..... | ..... | 2,900 | 200 |
| Total | 1,795,735 | 2,185,477 | 2,597,181 | 3,077,003 |

| County. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| Arapahoe | 1,273 | 654 | 633 | 559 |
| Boulder | 498,494 | 545,563 | 663,220 | 419,734 |
| Dolores | 3,475 | ..... | ..... | ..... |
| El Paso | 34,364 | 23,014 | 19,415 | 30,268 |
| Fremont | 545,789 | 538,887 | 536,787 | 245,616 |
| Garfield | 191,994 | 277,794 | 212,918 | 75,663 |
| Gunnison | 261,350 | 225,260 | 258,539 | 200,325 |
| Huerfano | 494,466 | 541,733 | 521,205 | 408,045 |
| Jefferson | 17,910 | 21,219 | 1,895 | 34,108 |
| Las Animas | 1,219,224 | 1,171,069 | 1,587,338 | 1,153,863 |
| La Plata | 72,471 | 81,500 | 104,992 | 53,571 |

*Coal product of Colorado since 1887, by counties*—Continued.

[Short tons.]

| County. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| Mesa | 5,000 | 5,050 | 18,100 | 31,750 |
| Park | 52,626 | 76,022 | 39,095 | 28,943 |
| Pitkin | 91,642 | ..... | 99,211 | 97,724 |
| Weld | 22,554 | 2,205 | 35,355 | 42,818 |
| Routt | ..... | 330 | 816 | 2,710 |
| Larimer | ..... | ..... | ..... | ..... |
| Douglas | ..... | 200 | 200 | ..... |
| San Miguel | ..... | ..... | ..... | ..... |
| Delta | ..... | 200 | 2,580 | 3,697 |
| Montezuma | ..... | 30 | 90 | 235 |
| Montrose | ..... | ..... | ..... | 100 |
| Rio Blanco | ..... | 100 | ..... | 1,680 |
| Total | 3,512,632 | 3,510,830 | 4,102,389 | 2,831,409 |

| County. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| Arapahoe | 540 | 398 | 368 | ..... | 30 |
| Boulder | 377,395 | 448,706 | 477,790 | 29,084 | ..... |
| Dolores | ..... | ..... | ..... | ..... | ..... |
| El Paso | 51,840 | 12,544 | 12,481 | ..... | 63 |
| Fremont | 315,344 | 294,822 | 304,589 | 9,767 | ..... |
| Garfield | 274,271 | 165,797 | 182,884 | 17,087 | ..... |
| Gunnison | 239,182 | 260,596 | 297,417 | 36,821 | ..... |
| Huerfano | 386,696 | 353,338 | 367,894 | 14,556 | ..... |
| Jefferson | ..... | ..... | 10,445 | 10,445 | ..... |
| Las Animas | 1,253,149 | 1,261,555 | 1,427,526 | 165,971 | ..... |
| La Plata | 106,099 | 104,661 | 76,788 | ..... | 27,873 |
| Mesa | 41,150 | 28,979 | 9,861 | ..... | 19,118 |
| Park | ..... | ..... | ..... | ..... | ..... |
| Pitkin | ..... | 168,413 | 171,111 | 2,698 | ..... |
| Weld | 27,934 | 4,300 | 8,310 | 4,010 | ..... |
| Routt, Larimer, Douglas, San Miguel, Delta, Montezuma, Montrose, Rio Blanco | 9,382 | 8,291 | 14,239 | 5,948 | ..... |
| Total | 3,082,982 | 3,112,400 | 3,361,703 | a249,303 | ..... |

a Net increase.

In connection with the above table it will be of interest to note the variations in the average prices in each county. The statistics of value by counties were not obtained prior to 1889, when the Eleventh Census was taken. Since that year, with the exception of 1891, the statistics have been collected in that way by the Geological Survey, and the average prices for eight years are shown in the following table. Only those counties are considered whose product averages 10,000 tons or over.

*Average prices for Colorado coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|
| Boulder | $1.53 | $1.32 | $1.36 | $1.28 | $1.28 | $1.38 | $1.32 | $1.29 |
| El Paso | 1.27 | 1.10 | 1.25 | 1.20 | 1.17 | 1.02 | .89 | 1.17 |
| Fremont | 2.12 | 1.54 | 1.92 | 1.60 | 1.67 | 1.67 | 1.58 | 1.62 |
| Garfield | 1.64 | 1.46 | 2.00 | 1.19 | 1.13 | 1.07 | 1.05 | 1.12 |
| Gunnison | 2.28 | 1.95 | 1.84 | 1.67 | 1.65 | 1.60 | 1.53 | 1.48 |
| Huerfano | 1.37 | 1.31 | 2.00 | 1.15 | 1.08 | 1.04 | 1.06 | 1.18 |
| Jefferson | 2.54 | 2.99 | 1.90 | 2.50 | 2.00 | ..... | ..... | 2.08 |
| La Plata | 1.91 | 2.76 | 1.76 | 1.45 | 1.63 | 1.42 | 1.46 | 1.46 |
| Las Animas | 1.16 | 1.16 | 1.22 | 1.01½ | 1.01 | .97 | .94 | .95 |
| Park | 2.49 | 3.00 | 2.40 | 2.50 | 3.15 | ..... | ..... | ..... |
| Pitkin | ..... | 1.45 | ..... | 1.12 | 1.13 | ..... | 1.13 | 1.18 |
| Weld | 1.51 | 1.38 | 2.00 | 1.49 | 1.73 | 1.26 | ..... | ..... |
| The State | 1.54 | 1.40 | 1.62 | 1.24 | 1.24 | 1.20 | 1.16 | 1.17 |

In the following table is shown the number of men employed during the past seven years, in counties producing 10,000 tons or over, together with the average working time for the last six years:

*Statistics of labor employed and working time at Colorado coal mines.*

| County. | 1890. | 1892. | | 1893. | |
|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. |
| Boulder | 979 | 193 | 1,128 | 142 | 1,143 |
| El Paso | 54 | 200 | 40 | 143 | 88 |
| Fremont | 1,049 | 195 | 1,040 | 182 | 1,268 |
| Garfield | 334 | 248 | 423 | 121 | 300 |
| Gunnison | 389 | 259 | 368 | 168 | 576 |
| Huerfano | 907 | 253 | 947 | 172 | 999 |
| Jefferson | 79 | 233 | 50 | 250 | 7 |
| La Plata | 97 | 288 | 124 | 235 | 152 |
| Las Animas | 1,531 | 246 | 1,450 | 229 | 2,243 |
| Park | 150 | 266 | 140 | 236 | 185 |
| Pitkin | 96 | ..... | ..... | 211 | 115 |
| Weld | 118 | 300 | 4 | 217 | 79 |
| The State | 5,827 | 229 | 5,747 | 188 | 7,202 |

*Statistics of labor employed and working time at Colorado coal mines*—Continued.

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. |
| Boulder | 170 | 1,041 | 160 | 859 | 144 | 682 | 164 | 805 |
| El Paso | 241 | 70 | 219 | 117 | 192 | 15 | 192 | 22 |
| Fremont | 204 | 1,581 | 170 | 1,016 | 110 | 1,407 | 123 | 896 |
| Garfield | 142 | 122 | 246 | 308 | 136 | 314 | 241 | 216 |
| Gunnison | 176 | 332 | 220 | 303 | 189 | 576 | 165 | 692 |
| Huerfano | 206 | 753 | 167 | 816 | 219 | 617 | 150 | 724 |
| Jefferson | 162 | 25 | ..... | ..... | ..... | ..... | 178 | 29 |
| La Plata | 40 | 249 | 80 | 502 | 215 | 179 | 218 | 130 |
| Las Animas | 240 | 1,799 | 214 | 1,859 | 192 | 2,578 | 215 | 1,971 |
| Park | 251 | 108 | ..... | ..... | ..... | ..... | ..... | ..... |
| Pitkin | 240 | 225 | ..... | ..... | 267 | 187 | 208 | 238 |
| Weld | 145 | 145 | 220 | 74 | ..... | ..... | ..... | ..... |
| The State | 193 | 6,707 | 182 | 6,125 | 172 | 6,704 | 180 | 5,852 |

The State is divided, for sake of convenience, into four geographical divisions known, respectively, as the northern, central, southern, and western. The first mentioned contains the counties of Arapahoe, Boulder, Jefferson, Larimer, Routt, and Weld. The central division embraces Douglas, El Paso, Fremont, and Park counties. The southern division contains the counties of Dolores, Huerfano, La Plata, and Las Animas, while Delta, Garfield, Gunnison, Mesa, Montezuma, Montrose, Pitkin, Rio Blanco, and San Miguel counties lie in the western district.

The following table shows the annual product of coal in Colorado since 1864, that of the years previous to 1877 being given by counties and of the years since, next to 1878 by districts:

*Coal product of Colorado from 1864 to 1897.*

| Year. | Locality. | Product. |
|---|---|---|
| | | *Short tons.* |
| 1864 | Jefferson and Boulder counties | 500 |
| 1865 | do | 1,200 |
| 1866 | do | 6,400 |
| 1867 | do | 17,000 |
| 1868 | do | 10,500 |
| 1869 | do | 8,000 |
| 1870 | do | 13,500 |
| 1871 | do | 15,600 |

*Coal product of Colorado from 1864 to 1897*—Continued.

| Year. | Locality. | Product. | |
|---|---|---|---|
| | | *Short tons.* | |
| 1872..... | Jefferson and Boulder counties..... | 14,200 | |
| | Weld County..... | 54,340 | |
| | | | 68,540 |
| 1873..... | Jefferson and Boulder counties..... | 14,000 | |
| | Weld County..... | 43,790 | |
| | Las Animas and Fremont counties ..... | 12,187 | |
| | | | 69,977 |
| 1874..... | Jefferson and Boulder counties..... | 15,000 | |
| | Weld County..... | 44,280 | |
| | Las Animas and Fremont counties ..... | 18,092 | |
| | | | 77,372 |
| 1875..... | Jefferson and Boulder counties..... | 23,700 | |
| | Weld County..... | 59,860 | |
| | Las Animas and Fremont counties ..... | 15,278 | |
| | | | 98,838 |
| 1876..... | Jefferson and Boulder counties..... | 28,750 | |
| | Weld County..... | 68,000 | |
| | Las Animas and Fremont counties ..... | 20,316 | |
| | | | 117,666 |
| 1877..... | ..... | ..... | 160,000 |
| 1878..... | Northern division ..... | 87,825 | |
| | Central division..... | 73,137 | |
| | Southern division ..... | 39,668 | |
| | | | 200,630 |
| 1879..... | Northern division ..... | 182,630 | |
| | Central division..... | 70,647 | |
| | Southern division ..... | 69,455 | |
| | | | 322,732 |
| 1880..... | Northern division ..... | 123,518 | |
| | Central division..... | 136,020 | |
| | Southern division ..... | 126,403 | |
| | Western division ..... | 1,064 | |
| | Unreported mines ..... | 50,000 | |
| | | | 437,005 |
| 1881..... | Northern division ..... | 156,126 | |
| | Central division..... | 174,882 | |
| | Southern division ..... | 269,045 | |
| | Western division ..... | 6,691 | |
| | Unreported mines ..... | 100,000 | |
| | | | 706,744 |
| 1882..... | Northern division ..... | 300,000 | |
| | Central division..... | 243,694 | |
| | Southern division ..... | 474,285 | |
| | Western division ..... | 43,500 | |
| | | | 1,061,479 |

*Coal product of Colorado from 1864 to 1897*—Continued.

| Year. | Locality. | Product. | |
|---|---|---|---|
| | | *Short tons.* | |
| 1883..... | Northern division | 243,903 | |
| | Central division | 396,401 | |
| | Southern division | 501,307 | |
| | Western division | 87,982 | |
| | | | 1,229,593 |
| 1884..... | Northern division | 253,282 | |
| | Central division | 296,188 | |
| | Southern division | 483,865 | |
| | Western division | 96,689 | |
| | | | 1,130,024 |
| 1885..... | Northern division | 242,846 | |
| | Central division | 416,373 | |
| | Southern division | 571,684 | |
| | Western division | 125,159 | |
| | | | 1,356,062 |
| 1886..... | Northern division | 260,145 | |
| | Central division | 408,857 | |
| | Southern division | 537,785 | |
| | Western division | 161,551 | |
| | | | 1,368,338 |
| 1887..... | Northern division | 364,619 | |
| | Central division | 491,764 | |
| | Southern division | 662,230 | |
| | Western division | 273,122 | |
| | | | 1,791,735 |
| 1888..... | Northern division | 353,909 | |
| | Central division | 529,891 | |
| | Southern division | 899,690 | |
| | Western division | 401,987 | |
| | | | 2,185,477 |
| 1889..... | Northern division | 364,928 | |
| | Central division | 370,324 | |
| | Southern division | 1,362,222 | |
| | Western division | 499,707 | |
| | | | 2,597,181 |
| 1890..... | Northern division | 486,010 | |
| | Central division | 473,329 | |
| | Southern division | 1,626,493 | |
| | Western division | 491,171 | |
| | | | 3,077,003 |
| 1891..... | Northern division | 540,231 | |
| | Central division | 632.779 | |
| | Southern division | 1,789,636 | |
| | Western division | 549,986 | |
| | | | 3,512,632 |

*Coal product of Colorado from 1864 to 1897*—Continued.

| Year. | Locality. | Product. | |
|---|---|---|---|
| | | *Short tons.* | |
| 1892..... | Northern division | 569,971 | |
| | Central division | 638,123 | |
| | Southern division | 1,794,302 | |
| | Western division | 508,434 | |
| | | | 3,510,830 |
| 1893..... | Northern division | 701,919 | |
| | Central division | 694,708 | |
| | Southern division | 2,213,535 | |
| | Western division | 492,227 | |
| | | | 4,102,289 |
| 1894..... | Northern division | 499,929 | |
| | Central division | 304,827 | |
| | Southern division | 1,615,479 | |
| | Western division | 411,174 | |
| | | | 2,831,409 |
| 1895..... | Northern division | 408,636 | |
| | Central division | 367,184 | |
| | Southern division | 1,745,944 | |
| | Western division | 561,218 | |
| | | | 3,082,982 |
| 1896..... | Northern division | 456,236 | |
| | Central division | 307,366 | |
| | Southern division | 1,719,554 | |
| | Western division | 629,244 | |
| | | | 3,112,400 |
| 1897..... | Northern division | 502,858 | |
| | Central division | 317,070 | |
| | Southern division | 1,872,208 | |
| | Western division | 669,567 | |
| | | | 3,361,703 |

## GEORGIA.

Total product in 1897, 195,869 short tons; spot value, $140,466.

The entire product of Georgia continues to come from two counties, Dade and Walker, in the northwestern corner of the State, which contain within their boundaries the extreme northeastern extremity of the Warrior coal field of Alabama.

The first output of coal in Georgia of which there is any record was obtained in 1884, the product amounting to 150,000 short tons. The largest production was in 1893, in which year 372,740 short tons are credited to Georgia. Since then the amount of coal mined has decreased each year. In 1894 the output decreased 18,629 tons, about 5 per cent. The following year it decreased 93,113 tons, or about 26 per cent. In

1896 the product was 22,452 tons, or about 8 per cent less than in 1895. The output in 1896 was only a little more than 60 per cent of that of 1893, while in 1897 the product was not quite 53 per cent.

The following table exhibits the tendency of coal production in the State, with the distribution of the product, value, etc., since 1889:

*Coal product of Georgia since 1889.*

| Year. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days worked. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| 1889 | 46,131 | 158 | 15,000 | 164,645 | 225,934 | $338,901 | $1.50 | ..... | ..... |
| 1890 | 57,949 | ..... | ..... | 170,388 | 228,337 | 238,315 | 1.04 | 313 | 425 |
| 1891 | 15,000 | 1,000 | 5,000 | 150,000 | 171,000 | 256,500 | 1.50 | 312 | 850 |
| 1892 | 52,614 | 250 | 3,756 | 158,878 | 215,498 | 212,761 | .99 | 277 | 467 |
| 1893 | 196,227 | ..... | 4,869 | 171,644 | 372,740 | 365,972 | .98 | 342 | 736 |
| 1894 | 178,610 | ..... | 8,978 | 166,523 | 354,111 | 299,290 | .85 | 304 | 729 |
| 1895 | 135,692 | 150 | 6,256 | 118,900 | 260,998 | 215,863 | .83 | 312 | *a* 848 |
| 1896 | 120,496 | 875 | 7,520 | 109,655 | 238,546 | 168,050 | .70 | 303 | *b* 713 |
| 1897 | 120,398 | 1,481 | 5,500 | 68,490 | 195,869 | 140,466 | .72 | 304 | *c* 469 |

*a* Includes 500 State convicts.
*b* Includes 360 State convicts.
*c* Includes 300 State convicts.

The following table shows the total annual product since 1884:

*Coal product of Georgia since 1884.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1884 | 150,000 | 1891 | 171,000 |
| 1885 | 150,000 | 1892 | 215,498 |
| 1886 | 223,000 | 1893 | 372,740 |
| 1887 | 313,715 | 1894 | 354,111 |
| 1888 | 180,000 | 1895 | 260,998 |
| 1889 | 225,934 | 1896 | 238,546 |
| 1890 | 228,337 | 1897 | 195,869 |

## IDAHO.

A product of 150 short tons, valued at $350, was reported from Canyon County, Idaho, in 1897. This is the only coal product reported from this State since 1888, when an output of 400 short tons was obtained.

## ILLINOIS.[1]

Total product in 1897, 20,072,758 short tons; spot value, $14,472,529.

Statistics relating to the production of coal in the State of Illinois have been compiled under the direction of the State Bureau of Labor Statistics for the past sixteen years. Following the usual custom, the Geological Survey has relied upon the report of the State bureau for the statistics of coal production in 1897. Illinois is the only State for which the statistics of production have not been compiled from direct returns by the operators to the Survey or its duly appointed and sworn special agents.

As compared with 1896, the output in 1897 shows an increase of 286,132 short tons, a gain of only 1.46 per cent, which is significant merely as showing a gain rather than a loss. The most noteworthy feature of the year was the decrease in the value of the product, this item showing a loss as compared with 1896 of $1,337,207. The general tendency toward lower prices which has been observed for the last four years continues, and is attended by lower wages paid to miners. The average price per ton for lump coal at the mine has fallen from $1.025 in 1893 to 85.2 cents in 1897; the average rate paid for hand mining in the same period has decreased from 71.4 cents per ton to 50.46 cents. This indicates that while the selling price has declined about 17 cents per ton, the miners' wages have fallen about 21 cents. The percentage decrease was 16.6 in the selling price and 29.3 in the mining rate.

The total number of mines operated in Illinois during 1897 was 853, of which 310 were reported as shipping mines and 543 as local mines. The general strike of 1897 affected 268 of the producing mines, and as there were only two of these in which less than ten men were employed, it is evident that the interruptions were almost entirely confined to the larger mines. The number of men on strike was 27,096, out of a total of 33,788, which is further evidence that the smaller or local mines were practically exempt. The State report on the strike says that 39 mines, having 2,370 employees, all but one employing more than 10 men, participated in the advanced mining rates, although the men continued to work.

The total tonnage won by machines in 1897 did not show much of an increase over 1896, the machine-mined product being 3,946,257 tons, as compared with 3,871,410 tons—a gain of 74,847 tons, or not quite 2 per cent. It is not possible, therefore, to attribute the increased individual efficiency shown by the statistics in 1897 to this cause. The number of employees of all kinds was less in 1897 than in 1896 by 3,244, and the average working days at shipping mines was 185 in 1897 against 186 in 1896; in spite of these facts, however, the total product for the State increased 286,132 short tons, only 74,847 tons of which increase was due to the use of machines.

[1] Abstract from the sixteenth annual report of the Bureau of Labor Statistics of Illinois.

The following table contains a brief summary of the items of chief interest in this industry for 1897 compared with 1896:

*Comparative statement of coal production in Illinois in 1896 and 1897.*

| Subject of inquiry. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|
| Number of counties in which coal is mined | 51 | 50 | ..... | 1 |
| Number of mines and openings of all kinds | 901 | 853 | ..... | 48 |
| Number of shipping mines | 330 | 310 | ..... | 20 |
| Number of mines in local trade | 571 | 543 | ..... | 28 |
| Number of tons of coal mined, all grades | 19,786,626 | 20,072,758 | 286,132 | ..... |
| Number of tons of lump coal (2,000 pounds) | 14,210,024 | 14,672,241 | 462,217 | ..... |
| Number of tons of other grades of coal | 5,576,602 | 5,400,517 | ..... | 176,085 |
| Number of acres worked out (estimated) | 3,292.49 | ..... | ..... | ..... |
| Number of employees of all kinds | 37,032 | 33,788 | ..... | 3,244 |
| Number of boys over 14 years of age under ground | 911 | ..... | ..... | ..... |
| Number of employees under ground | 33,175 | 30,248 | ..... | 2,927 |
| Number of employees above ground | 3,857 | 3,540 | ..... | 317 |
| Average number of days active operation—shipping mines | 186 | 185 | ..... | 1 |
| Aggregate spot value of total product | $15,809,736 | $14,472,529 | ..... | $1,337,207 |
| Aggregate spot value of lump coal | $12,565,334 | $12,500,750 | ..... | $64,584 |
| Aggregate value of other grades of coal | $3,244,402 | $1,971,189 | ..... | $1,273,213 |
| Average value of lump coal per ton at the mine | $0.899 | $0.852 | ..... | $0.047 |
| Average value of other grades of coal at the mine | $0.585 | $0.365 | ..... | $0.220 |
| Average price paid for hand mining—the year | $0.530 | $0.5046 | ..... | $0.0254 |
| Number of mining machines in use | 307 | 320 | 13 | ..... |
| Number of tons of coal, all grades, mined by machines | 3,871,410 | 3,946,257 | 74,847 | ..... |
| Number of kegs of powder used | 369,505 | 392,133 | 22,628 | ..... |
| Number of men killed | 77 | 69 | ..... | 8 |
| Number of wives made widows | 44 | 46 | 2 | ..... |

*Comparative statement of coal production in Illinois in 1896 and 1897*—Continued.

| Subject of inquiry. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|
| Number of children left fatherless | 155 | 147 | ..... | 8 |
| Number of men injured so as to lose time | 672 | 518 | ..... | 154 |
| Number of tons of coal mined to each life lost | 256,969 | 290,909 | 33,940 | ..... |
| Number of tons of coal mined to each man injured | 29,444 | 38,750 | 9,306 | ..... |
| Number of employees to each life lost | 481 | 489.7 | 8.7 | ..... |
| Number of employees to each man injured | 55 | 65 | 10 | ..... |
| Number of new mines opened and old ones reopened | 142 | 79 | ..... | 63 |
| Number of mines closed or abandoned | 115 | 118 | 3 | ..... |

The following table shows the product of lump coal and other grades of coal in Illinois, compared with the total output since 1882:

*Total number of mines, men, and product, lump and other grades, since 1882.*

| Year. | Whole number of mines. | Whole number of men employed. | Total product in tons (2,000 pounds). | Total tons of lump coal. | Total tons of other grades. |
|---|---|---|---|---|---|
| 1882 | 704 | 20,290 | 11,017,069 | 9,115,653 | 1,901,506 |
| 1883 | 639 | 23,939 | 12,123,456 | 10,030,991 | 2,092,465 |
| 1884 | 741 | 25,575 | 12,208,075 | 10,101,005 | 2,107,070 |
| 1885 | 778 | 25,946 | 11,834,459 | 9,791,874 | 2,402,585 |
| 1886 | 787 | 25,846 | 11,175,241 | 9,246,435 | 1,928,806 |
| 1887 | 801 | 26,804 | 12,423,066 | 10,278,890 | 2,144,176 |
| 1888 | 822 | 29,410 | 14,328,181 | 11,855,188 | 2,472,993 |
| 1889 | 854 | 30,076 | 14,017,298 | 11,597,963 | 2,419,335 |
| 1890 | 936 | 28,574 | 15,274,727 | 12,638,364 | 2,636,363 |
| 1891 | 918 | 32,951 | 15,660,698 | 12,960,224 | 2,700,474 |
| 1892 | 839 | 33,632 | 17,862,276 | 14,730,963 | 3,131,313 |
| 1893 | 788 | 35,390 | 19,949,564 | 16,112,899 | 3,836,655 |
| 1894 | 836 | 38,477 | 17,113,576 | 13,865,284 | 3,248,292 |
| 1895 | 874 | 38,630 | 17,735,864 | 14,045,962 | 3,689,902 |
| 1896 | 901 | 37,032 | 19,786,626 | 14,210,024 | 5,576,602 |
| 1897 | 853 | 33,788 | 20,072,758 | 14,672,241 | 5,400,517 |

In the following table is shown a comparison between the value of the total product and that of lump coal together with the rate paid for mining and the ratio between the cost of mining and the selling price for a period of sixteen years. It will be observed that the selling price of coal has shown an almost steady decline since 1882, the total decline amounting to 66 cents, or about 44 per cent, an average drop per year of 4 cents a ton. The price paid for hand mining has fallen from 80 cents in 1883 to 50.5 cents in 1897, a decrease of 29.7 cents, or about 37 per cent, showing that the price paid for mining has not decreased during this period in as great a proportion as the selling price, although since 1893 the rate paid for mining has decreased in greater proportion than the selling price.

*Values and mining prices for Illinois coal in sixteen years, 1882–1897.*

| Year. | All grades. | Lump coal. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Aggregate value of total product at the mine. | Aggregate value of lump coal at the mine. | Average value at the mine, per ton. | Decrease from 1882, per ton. | Number of tons considered in finding price paid for mining. | Average price paid for hand mining, per ton. | Decrease from 1883. | Ratio of mining price to selling value. |
| 1897 | $14,472,529 | $12,500,750 | $0.852 | $0.658 | 12,552,099 | $0.505 | $0.297 | 59.3 |
| 1896 | 15,809,736 | 12,565,334 | .899 | .611 | 9,371,582 | .530 | .272 | 58.9 |
| 1895 | 14,239,157 | 13,090,836 | .932 | .578 | 7,868,006 | .573 | .229 | 61.4 |
| 1894 | 15,282,111 | 13,998,588 | 1.009 | .501 | 7,368,850 | .671 | .131 | 66.5 |
| 1893 | 17,827,595 | 16,517,960 | 1.025 | .485 | 6,061,413 | .714 | .088 | 69.7 |
| 1892 | 16,243,645 | 15,158,430 | 1.029 | .481 | 7,353,831 | .719 | .083 | 69.8 |
| 1891 | 14,237,094 | 13,068,854 | 1.008 | .502 | 6,694,004 | .715 | .087 | 70.9 |
| 1890 | ..... | 12,882,936 | 1.019 | .491 | 9,056,109 | .683 | .119 | 67.0 |
| 1889 | ..... | 12,496,885 | 1.078 | .432 | 9,251,250 | .731 | .071 | 67.9 |
| 1888 | ..... | 13,312,376 | 1.123 | .387 | 9,611,978 | .717 | .085 | 63.9 |
| 1887 | ..... | 11,153,596 | 1.085 | .425 | 10,278,890 | .727 | .075 | 67.0 |
| 1886 | ..... | 10,171,078 | 1.10 | .41 | 9,246,435 | .676 | .126 | 61.5 |
| 1885 | ..... | 11,456,493 | 1.17 | .34 | 9,791,874 | .725 | .077 | 62.0 |
| 1884 | ..... | 12,727,266 | 1.26 | .25 | 10,101,005 | .783 | .019 | 62.1 |
| 1883 | ..... | 14,845,867 | 1.48 | .03 | 10,030,991 | .802 | ..... | 54.2 |
| 1882 | ..... | 13,764,636 | 1.51 | ..... | ..... | ..... | ..... | ..... |

**In the following table will be found all the coal-producing counties of the State, named and assembled by districts, together with the output of each from 1887 to 1897:**

*Output of coal in Illinois, by counties, for eleven years.*

| Districts and counties. | Lump coal. | | |
|---|---|---|---|
| | 1887. | 1888. | 1889. |
| | *Short tons.* | *Short tons.* | *Short tons.* |
| First district | 2,686,829 | 2,877,794 | 2,530,453 |
| Counties: | | | |
| Grundy | 792,954 | 862,866 | 698,033 |
| Kankakee | 97,000 | 82,000 | 67,380 |
| Lasalle | 1,125,235 | 1,090,435 | 1,039,703 |
| Livingston | 387,600 | 495,388 | 382,965 |
| Will | 284,040 | 347,105 | 342,372 |
| Second district | 1,069,027 | 1,293,187 | 1,087,848 |
| Counties: | | | |
| Bureau | 459,580 | 635,097 | 493,730 |
| Hancock | 6,208 | 6,515 | 6,028 |
| Henry | 117,533 | 108,831 | 101,716 |
| Knox | 64,324 | 57,013 | 57,588 |
| Marshall | 73,928 | 87,013 | 59,784 |
| McDonough | 110,103 | 104,274 | 98,386 |
| Mercer | 127,708 | 167,931 | 175,690 |
| Rock Island | 85,282 | 57,872 | 47,363 |
| Schuyler | 22,686 | 34,403 | 16,243 |
| Stark | 17,865 | 18,690 | 19,171 |
| Warren | 13,810 | 15,518 | 12,149 |
| Third district | 1,781,395 | 2,192,121 | 2,050,349 |
| Counties: | | | |
| Cass | 2,325 | 7,300 | 4,414 |
| Fulton | 337,215 | 461,589 | 366,577 |
| Logan | 159,000 | 174,330 | 138,700 |
| McLean | 141,700 | 117,110 | 129,322 |
| Menard | 155 621 | 181,075 | 181,621 |
| Peoria | 452,123 | 533,817 | 454,731 |
| Tazewell | 51,847 | 59,324 | 67,973 |
| Vermilion | 359,119 | 499,076 | 537,411 |
| Woodford | 122,445 | 158,500 | 169,600 |

*Output of coal in Illinois, by counties, for eleven years*—Continued.

| Districts and counties. | Lump coal. | | |
|---|---|---|---|
| | 1887. | 1888. | 1889. |
| | *Short tons.* | *Short tons.* | *Short tons.* |
| Fourth district | 2,568,291 | 2,854,540 | 3,164,835 |
| Counties: | | | |
| Bond | 36,076 | 38,200 | 59,724 |
| Calhoun | ..... | 1,036 | 1,078 |
| Christian | 149,973 | 147,030 | 249,774 |
| Coles | 34,612 | 27,210 | ..... |
| Effingham | ..... | ..... | ..... |
| Greene | 12,578 | 14,494 | 19,048 |
| Jasper | ..... | ..... | ..... |
| Jersey | 2,684 | 3,949 | 4,040 |
| Macon | 118,183 | 280,805 | 233,309 |
| Macoupin | 926,588 | 1,016,624 | 1,202,187 |
| Madison | 521,705 | 512,948 | 490,181 |
| Montgomery | 10,220 | 14,295 | 24,425 |
| Morgan | 6,669 | 12,545 | 13,019 |
| Pike | ..... | ..... | ..... |
| Richland | ..... | ..... | ..... |
| Sangamon | 730,391 | 764,970 | 846,012 |
| Scott | 9,802 | 12,491 | 15,028 |
| Shelby | 8,810 | 7,943 | 7,010 |
| Fifth district | 2,173,348 | 2,637,546 | 2,764,478 |
| Counties: | | | |
| Clinton | 55,238 | 66,463 | 121,557 |
| Franklin | ..... | ..... | ..... |
| Gallatin | 31,437 | 45,374 | 30,044 |
| Hardin | ..... | ..... | ..... |
| Hamilton | ..... | ..... | ..... |
| Johnson | 28,000 | 28,210 | 3,000 |
| Jackson | 375,718 | 445,575 | 477,474 |
| Jefferson | ..... | ..... | ..... |
| Marion | 98,915 | 156,975 | 180,777 |
| Perry | 319,552 | 306,235 | 381,347 |
| Randolph | 74,263 | 167,321 | 98,202 |
| Saline | 19,518 | 32,550 | 35,496 |
| St. Clair | 1,018,149 | 1,184,579 | 1,198,100 |
| Washington | 40,220 | 43,600 | 36,220 |
| Williamson | 112,338 | 160,664 | 202,261 |
| The State | 10,278,890 | 11,855,188 | 11,597,963 |

*Output of coal in Illinois, by counties, for eleven years*—Continued.

| Districts and counties. | Lump coal. | | All grades. |
|---|---|---|---|
| | 1890. | 1891. | 1891. |
| | *Short tons.* | *Short tons.* | *Short tons.* |
| First district | 2,303,326 | 2,701,652 | 3,082,915 |
| Counties: | | | |
| Grundy | 654,017 | 861,507 | 921,907 |
| Kankakee | 62,460 | 84,808 | 90,908 |
| Lasalle | 926,214 | 1,174,961 | 1,378,168 |
| Livingston | 372,504 | 355,800 | 458,329 |
| Will | 288,131 | 224,576 | 233,603 |
| Second district | 1,002,600 | 1,215,883 | 1,440,266 |
| Counties: | | | |
| Bureau | 372,701 | 612,292 | 701,064 |
| Hancock | 6,948 | 6,740 | 6,740 |
| Henry | 98,734 | 116,173 | 131,986 |
| Knox | 51,653 | 44,974 | 44,974 |
| Marshall | 56,574 | 53,319 | 65,219 |
| McDonough | 83,401 | 73,596 | 81,732 |
| Mercer | 238,290 | 222,237 | 314,360 |
| Rock Island | 39,696 | 38,654 | 41,540 |
| Schuyler | 21,536 | 15,369 | 20,122 |
| Stark | 18,672 | 20,157 | 20,157 |
| Warren | 14,095 | 12,372 | 12,372 |
| Third district | 2,375,970 | 2,336,500 | 2,794,004 |
| Counties: | | | |
| Cass | 4,650 | 5,680 | 6,466 |
| Fulton | 404,417 | 391,721 | 484,117 |
| Logan | 164,650 | 155,048 | 176,052 |
| McLean | 173,492 | 184,629 | 230,129 |
| Menard | 230,662 | 171,784 | 204,583 |
| Peoria | 482,725 | 498,601 | 564,119 |
| Tazewell | 81,141 | 85,692 | 107,252 |
| Vermilion | 704,509 | 728,156 | 880,466 |
| Woodford | 129,724 | 115,189 | 140,820 |
| Fourth district | 3,716,464 | 3,532,233 | 4,428,109 |
| Counties: | | | |
| Bond | 66,746 | 76,067 | 102,535 |
| Calhoun | 1,468 | 2,773 | 2,773 |
| Christian | 439,451 | 513,315 | 718,326 |
| Coles | ..... | ..... | ..... |

*Output of coal in Illinois, by counties, for eleven years*—Continued.

| Districts and counties. | Lump coal. | | All grades. |
|---|---|---|---|
| | 1890. | 1891. | 1891. |
| Counties—Continued. | *Short tons.* | *Short tons.* | *Short tons.* |
| Effingham | 796 | *a* 487 | *a* 487 |
| Greene | 11,714 | 16,442 | 16,442 |
| Jasper | 152 | (*b*) | (*b*) |
| Jersey | 7,500 | 4,252 | 4,252 |
| Macon | 179,050 | 126,569 | 207,286 |
| Macoupin | 1,369,919 | 1,149,380 | 1,461,344 |
| Madison | 646,228 | 600,294 | 719,308 |
| Montgomery | 58,617 | 94,975 | 107,190 |
| Morgan | 16,601 | 6,584 | 7,610 |
| Pike | 135 | (*b*) | (*b*) |
| Richland | 154 | (*b*) | (*b*) |
| Sangamon | 879,888 | 912,643 | 1,051,604 |
| Scott | 20,022 | 14,255 | 14,755 |
| Shelby | 18,023 | 14,197 | 14,197 |
| Fifth district | 3,240,004 | 3,173,956 | 3,915,404 |
| Counties: | | | |
| Clinton | 170,416 | 146,903 | 174,166 |
| Franklin | 700 | 200 | 200 |
| Gallatin | 52,383 | 31,119 | 34,462 |
| Hardin | 40 | 24 | 24 |
| Hamilton | 450 | 280 | 280 |
| Johnson | 12,110 | 424 | 424 |
| Jackson | 580,521 | 477,330 | 681,859 |
| Jefferson | 2,100 | 1,104 | 1,104 |
| Marion | 218,499 | 251,283 | 321,652 |
| Perry | 497,768 | 457,431 | 604,152 |
| Randolph | 134,699 | 162,717 | 172,321 |
| Saline | 45,845 | 38,729 | 54,269 |
| St. Clair | 1,332,978 | 1,389,429 | 1,595,839 |
| Washington | 25,160 | 56,500 | 68,200 |
| Williamson | 166,335 | 160,483 | 206,452 |
| The State | 12,638,364 | 12,960,224 | 15,660,698 |

*a* Includes Jasper, Pike, and Richland counties.
*b* Included in Effingham County.

*Output of coal in Illinois, by counties, for eleven years*—Continued.

| Districts and counties. | All grades. | | | |
|---|---|---|---|---|
| | 1892. | 1893. | 1894. | 1895. |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| First district | 3,458,066 | 3,394,686 | 2,685,244 | 2,735,711 |
| Counties: | | | | |
| Grundy | 1,108,419 | 1,186,919 | 1,130,420 | 1,261,838 |
| Kankakee | 92,158 | 88,700 | 57,883 | 83,513 |
| Lasalle | 1,544,311 | 1,494,826 | 1,134,097 | 1,084,552 |
| Livingston | 532,667 | 542,516 | 342,127 | 267,133 |
| Will | 113,846 | 81,725 | 20,717 | 38,675 |
| Second district | 1,733,608 | 2,000,664 | 1,703,623 | 1,995,298 |
| Counties: | | | | |
| Bureau | 943,496 | 1,143,270 | 878,937 | 834,541 |
| Hancock | 5,380 | 5,060 | 10,315 | 10,274 |
| Henry | 156,736 | 156,261 | 111,640 | 135,967 |
| Knox | 43,137 | 49,808 | 51,530 | 58,330 |
| Marshall | 78,576 | 92,144 | 134,696 | 346,281 |
| McDonough | 91,127 | 102,926 | 53,367 | 53,387 |
| Mercer | 328,542 | 363,206 | 374,003 | 462,011 |
| Rock Island | 36,109 | 34,308 | 41,641 | 45,585 |
| Schuyler | 16,792 | 18,735 | 13,828 | 12,600 |
| Stark | 22,349 | 23,070 | 22,625 | 22,131 |
| Warren | 11,364 | 11,876 | 11,041 | 14,191 |
| Third district | 3,260,951 | 3,397,433 | 3,077,918 | 2,952,260 |
| Counties: | | | | |
| Cass | 15,330 | 23,150 | 18,900 | 19,120 |
| Fulton | 666,473 | 772,497 | 557,703 | 468,792 |
| Logan | 187,356 | 189,319 | 186,300 | 181,975 |
| McLean | 222,372 | 204,827 | 167,294 | 164,140 |
| Menard | 285,695 | 281,635 | 295,852 | 277,738 |
| Peoria | 632,939 | 620,149 | 611,792 | 437,457 |
| Tazewell | 120,156 | 128,957 | 93,599 | 94,106 |
| Vermilion | 972,589 | 996,768 | 989,813 | 1,177,375 |
| Woodford | 158,041 | 180,131 | 156,665 | 131,557 |
| Fourth district | 5,117,600 | 5,784,866 | 5,173,303 | 5,612,764 |
| Counties: | | | | |
| Bond | 121,812 | 78,600 | 79,591 | 93,515 |
| Calhoun | 4,637 | 4,584 | 3,478 | 9,200 |
| Christian | 767,354 | 839,650 | 1,005,500 | 735,361 |

*Output of coal in Illinois, by counties, for eleven years*—Continued.

| Districts and counties. | All grades. | | | |
|---|---|---|---|---|
| | 1892. | 1893. | 1894. | 1895. |
| Counties—Continued. | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Coles | ..... | ..... | ..... | ..... |
| Effingham | *a* 302 | *a* 520 | *a* 5,440 | 7,800 |
| Greene | 19,870 | 10,995 | 18,600 | 11,345 |
| Jasper | (*b*) | (*b*) | ..... | ..... |
| Jersey | 3,378 | 5,904 | 2,238 | ..... |
| Macon | 227,020 | 280,233 | 227,820 | 231,000 |
| Macoupin | 1,823,136 | 1,988,069 | 1,575,045 | 1,948,992 |
| Madison | 873,770 | 951,894 | 889,768 | 97[illegible],161 |
| Montgomery | 147,870 | 175,712 | 178,040 | 197,842 |
| Morgan | 4,266 | 2,142 | ..... | ..... |
| Pike | (*b*) | (*b*) | (*b*) | (*b*) |
| Richland | (*b*) | (*b*) | (*b*) | (*b*) |
| Sangamon | 1,091,014 | 1,410,346 | 1,142,299 | 1,318,092 |
| Scott | 17,506 | 22,757 | 19,025 | 17,730 |
| Shelby | 15,665 | 13,460 | 26,450 | 63,726 |
| Fifth district | 4,292,051 | 5,371,915 | 4,473,488 | 4,439,831 |
| Counties: | | | | |
| Clinton | 191,873 | 255,095 | 200,920 | 284,487 |
| Franklin | 200 | 120 | ..... | ..... |
| Gallatin | 14,502 | 17,457 | 155,351 | 20,330 |
| Hardin | ..... | ..... | ..... | ..... |
| Hamilton | 220 | 244 | *c* 620 | 4,645 |
| Johnson | 2,200 | ..... | ..... | ..... |
| Jackson | 869,514 | 926,242 | 766,514 | 739,661 |
| Jefferson | 100 | 90 | ..... | 27,880 |
| Marion | 376,519 | 480,529 | 478,757 | 538,900 |
| Perry | 461,068 | 860,151 | 530,490 | 587,444 |
| Randolph | 168,979 | 171,055 | 193,247 | 194,481 |
| Saline | 61,602 | 36,436 | 36,913 | 45,202 |
| St. Clair | 1,759,822 | 2,133,870 | 1,623,684 | 1,479,106 |
| Washington | 62,966 | 72,200 | 49,835 | 56,220 |
| Williamson | 322,486 | 418,426 | 437,157 | 461,475 |
| The State | 17,862,276 | 19,949,564 | 17,113,576 | 17,735,864 |

*a* Includes Jasper, Pike, and Richland counties.
*b* Included in Effingham County.
*c* Includes Franklin and Jefferson counties.

*Output of coal in Illinois, by counties, for eleven years*—Continued.

| Districts and counties. | All grades. | |
|---|---|---|
| | 1896. | 1897. |
| | *Short tons.* | *Short tons.* |
| First district | 3,034,777 | 2,937,980 |
| Counties: | | |
| Grundy | 1,247,394 | 1,077,576 |
| Kankakee | 72,395 | 180,683 |
| Lasalle | 1,409,085 | 1,508,833 |
| Livingston | 218,953 | 145,206 |
| Will | 86,950 | 25,682 |
| Second district | 2,690,220 | 2,738,408 |
| Counties: | | |
| Bureau | 1,042,304 | 1,145,312 |
| Henry | 136,415 | 119,497 |
| Marshall | 389,429 | 339,820 |
| Mercer | 450,071 | 425,518 |
| Peoria | 457,061 | 504,309 |
| Rock Island | 34,065 | 35,651 |
| Stark | 18,085 | 19,472 |
| Woodford | 162,790 | 148,829 |
| Third district | 628,835 | 575,199 |
| Counties: | | |
| Brown | ..... | 1,760 |
| Fulton | 516,349 | 469,034 |
| Hancock | 4,497 | 4,160 |
| Knox | 39,557 | 41,773 |
| McDonough | 47,821 | 40,532 |
| Schuyler | 7,915 | 7,841 |
| Warren | 12,696 | 10,099 |
| Fourth district | 2,802,960 | 2,916,162 |
| Counties: | | |
| Cass | 8,612 | 4,536 |
| Logan | 166,000 | 168,917 |
| Macon | 188,207 | 173,163 |
| Menard | 347,365 | 328,920 |
| McLean | 156,891 | 153,334 |
| Tazewell | 113,541 | 86,669 |
| Vermilion | 1,822,344 | 2,000,623 |

*Output of coal in Illinois, by counties, for eleven years*—Continued.

| Districts and counties. | All grades. | |
|---|---|---|
| | 1896. | 1897. |
| | *Short tons.* | *Short tons.* |
| Fifth district | 4,689,980 | 5,009,102 |
| Counties: | | |
| Calhoun | 6,000 | 3,868 |
| Christian | 763,228 | 837,897 |
| Greene | 8,270 | 7,200 |
| Macoupin | 2,097,539 | 1,975,981 |
| Montgomery | 171,099 | 251,249 |
| Sangamon | 1,587,812 | 1,838,453 |
| Scott | 18,410 | 25,125 |
| Shelby | 35,297 | 69,329 |
| Morgan and Jersey | 2,325 | ..... |
| Sixth district | 3,776,164 | 3,558,405 |
| Counties: | | |
| Bond | 71,058 | 104,256 |
| Clinton | 309,504 | 328,184 |
| Madison | 1,080,718 | 780,921 |
| Marion | 643,561 | 626,850 |
| St. Clair | 1,671,323 | 1,718,194 |
| Seventh district | 2,163,690 | 2,337,502 |
| Counties: | | |
| Gallatin | 26,350 | 19,945 |
| Hamilton | 1,000 | 760 |
| Jackson | 771,384 | 675,212 |
| Jefferson | 10,100 | 51,355 |
| Johnson | 1,250 | 2,778 |
| Perry | 626,507 | 689,921 |
| Randolph | 202,838 | 150,647 |
| Saline | 46,495 | 51,689 |
| Washington | 33,360 | 25,715 |
| Williamson | 444,406 | 669,480 |
| The State | 19,786,626 | 20,072,758 |

## INDIANA.

Total product in 1897, 4,151,169 short tons; spot value, $3,472,348.

The coal output of Indiana in 1897 was the largest in the history of the State, exceeding that of 1896 by 245,390 short tons, or about 6 per cent. Prior to 1897 the largest production was obtained in 1895, when 3,995,892 short tons were won, and compared with which the product in 1897 shows a gain of 155,277 short tons. The value of the product in 1897 increased in about the same proportion as the quantity compared with 1896, there being no change in the average price. But while the value in 1897 was $210,611 more than that of 1896, it was $170,000 less than that of 1895 and $583,000 less than the value of the product in 1893, when only 3,791,851 tons were produced.

The number of tons of coal mined by machines in 1897 was 1,023,361, against 964,378 the previous year. In both years the machine-mined product was a little less than 25 per cent of the total, although the number of machines in use decreased from 186 in 1896 to 174 in 1897.

About 50 per cent of the mines of the State (57 out of 115) were affected by the general strike of 1897. The total number of men on strike was 5,923, and they were idle an average of seventy-three days. In spite of this, the average time made in 1897 was more than the previous year; the average working time, as will be seen by the following tables, was one hundred and seventy-six days as compared with one hundred and sixty-three in 1896.

Clay county bore the brunt of the labor troubles. Of the 28 mines in the county, 19 were idle by reason of the strike, and 2,295 men out of a total of 2,682 were idle an average of seventy-four days, involving a loss in working time of 169,036 days. One-third of the entire number of mines involved and more than that proportion of the men made idle were in Clay county, and the product of the county decreased 306,708 short tons, or nearly 25 per cent, as compared with 1896. The entire amount of time lost by the strike was 431,837 days, distributed as follows:

*Strikes in the Indiana coal mines during 1897.*

| County. | Number of mines where strikes occurred. | Number of men on strike. | Average number of days idle. | Total number of working days lost. |
|---|---|---|---|---|
| Clay | 19 | 2,295 | 74 | 169,036 |
| Daviess | 4 | 414 | 121 | 49,923 |
| Fountain | 2 | 160 | 78 | 12,520 |
| Gibson | 1 | 63 | 30 | 1,890 |
| Greene | 5 | 723 | 74 | 53,484 |
| Knox | 2 | 84 | 82 | 6,884 |
| Parke | 7 | 857 | 78 | 66,877 |
| Pike | 3 | 190 | 10 | 1,900 |
| Sullivan | 4 | 550 | 71 | 38,875 |
| Vanderburg | 1 | 90 | 12 | 1,080 |
| Vigo | 5 | 406 | 67 | 27,188 |
| Warrick | 4 | 91 | 24 | 2,180 |
| The State | 57 | 5,923 | 73 | 431,837 |

There were fifteen counties producing coal in 1897, the same as in 1896. The details of the production by counties in the last two years have been as follows:

*Coal product of Indiana in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Clay | 29 | 1,182,967 | 16,810 | 32,658 | ..... | 1,232,435 | $1,185,230 | $0.96 | 171 | 3,290 |
| Daviess | 4 | 180,768 | 10,767 | 1,240 | ..... | 192,775 | 168,270 | .87 | 176 | 440 |
| Fountain | 2 | 101,300 | 4,000 | 350 | ..... | 105,650 | 84,970 | .80 | 240 | 122 |
| Greene | 8 | 280,484 | 3,497 | 6,065 | ..... | 290,046 | 222,157 | .77 | 157 | 659 |
| Gibson, Knox | 4 | 31,700 | 20,255 | 3,320 | ..... | 55,275 | 42,500 | .77 | 165 | 105 |
| Parke | 16 | 924,451 | 5,354 | 9,872 | ..... | 339,677 | 294,121 | .87 | 116 | 1,138 |
| Perry | 2 | 20,227 | 5,500 | 500 | ..... | 26,227 | 30,005 | 1.12 | 174 | 83 |
| Pike | 5 | 184,879 | 3,522 | 5,240 | 7,776 | 201,417 | 138,986 | .69 | 162 | 384 |
| Spencer | 12 | 235 | 16,463 | 5 | ..... | 16,703 | 22,448 | 1.34 | 157 | 50 |
| Sullivan | 11 | 475,614 | 7,972 | 30,519 | 1,180 | 515,285 | 343,094 | .67 | 186 | 724 |
| Vanderburg | 5 | 49,570 | 115,735 | 5,450 | ..... | 170,755 | 175,862 | 1.03 | 222 | 293 |
| Vermillion | 3 | 339,316 | 1,000 | 6,850 | ..... | 347,166 | 258,833 | .75 | 214 | 657 |
| Vigo | 7 | 225,092 | 6,807 | 5,748 | ..... | 237,647 | 167,840 | .70 | 116 | 674 |
| Warrick | 23 | 74,867 | 58,229 | 5,625 | ..... | 138,721 | 91,421 | .66 | 175 | 187 |
| Small mines | ..... | ..... | 36,000 | ..... | ..... | 36,000 | 36,000 | ..... | ..... | ..... |
| Total | 131 | 3,471,470 | 311,911 | 113,442 | 8,956 | 3,905,779 | 3,261,737 | .84 | 163 | 8,806 |

*Coal product of Indiana in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Clay | 28 | 860,625 | 29,362 | 35,740 | ..... | 925,727 | $992,515 | $1.07 | 169 | 2,682 |
| Daviess | 5 | 173,529 | 35,390 | 2,878 | ..... | 211,797 | 192,532 | .91 | 157 | 502 |
| Fountain, Gibson | 4 | 159,606 | 15,953 | 3,100 | ..... | 178,659 | 158,507 | .89 | 213 | 235 |
| Greene | 6 | 435,939 | 958 | 11,976 | ..... | 448,873 | 333,926 | .74 | 186 | 890 |
| Knox | 3 | 21,362 | 14,390 | 1,000 | ..... | 36,752 | 29,997 | .82 | 190 | 96 |
| Parke | 13 | 400,013 | 19,985 | 14,009 | ..... | 434,007 | 379,886 | .88 | 164 | 1,126 |
| Perry | 2 | 17,612 | 5,580 | 520 | ..... | 23,712 | 23,782 | 1.00 | 163 | 80 |
| Pike | 5 | 235,393 | 764 | 4,862 | 7,023 | 248,043 | 183,967 | .74 | 188 | 427 |
| Spencer | 6 | ..... | 4,339 | ..... | ..... | 4,339 | 4,973 | 1.15 | 141 | 20 |
| Sullivan | 13 | 449,008 | 16,277 | 14,760 | ..... | 480,045 | 307,123 | .64 | 147 | 913 |
| Vanderburg | 5 | 66,763 | 109,677 | 6,360 | ..... | 182,800 | 153,230 | .84 | 222 | 361 |
| Vermilion | 3 | 251,000 | 62,720 | 7,840 | ..... | 321,560 | 253,000 | .79 | 213 | 550 |
| Vigo | 10 | 415,926 | 11,011 | 6,335 | 9,259 | 442,531 | 278,239 | .63 | 173 | 767 |
| Warrick | 12 | 143,723 | 30,606 | 1,995 | ..... | 176,324 | 144,671 | .82 | 210 | 237 |
| Small mines | ..... | ..... | 36,000 | ..... | ..... | 36,000 | 36,000 | ..... | ..... | ..... |
| Total | 115 | 3,630,499 | 393,012 | 111,376 | 16,282 | 4,151,169 | 3,472,348 | .84 | 176 | 8,886 |

Previous to 1889 the statistics of production by counties were not obtained. The following table shows the annual product by counties since that year, with a statement of the increase or decrease in each county in 1897 as compared with 1896:

*Coal product of Indiana since 1889, by counties.*

[Short tons.]

| County. | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|
| Clay | 695,649 | 1,161,730 | 980,921 | 1,146,897 | 1,209,703 |
| Daviess | 191,585 | 189,696 | 155,358 | 174,560 | 319,787 |
| Dubois | 15,848 | 13,994 | 7,700 | ..... | 10,142 |
| Fountain | 41,141 | 24,000 | 23,700 | 13,888 | 4,000 |
| Gibson | 1,267 | ..... | ..... | ..... | ..... |
| Greene | 185,849 | 197,338 | 164,965 | 228,574 | 259,930 |
| Knox | 9,040 | ..... | ..... | 14,314 | 13,357 |
| Martin | 710 | ..... | ..... | ..... | ..... |
| Owen | 3,958 | ..... | 12,600 | 8,200 | 5,785 |
| Parke | 357,434 | 345,460 | 307,382 | 394,335 | 491,847 |
| Perry | 40,050 | 40,201 | 35,400 | 37,796 | 36,252 |
| Pike | 154,524 | 115,836 | 122,066 | 78,760 | 243,553 |
| Spencer | 18,456 | 11,656 | 15,340 | 8,426 | 7,647 |
| Sullivan | 317,252 | 286,323 | 181,434 | 316,893 | 290,482 |
| Vanderburg | 183,942 | 192,284 | 205,731 | 190,346 | 186,053 |
| Vermilion | 187,651 | 173,000 | 228,488 | 301,063 | 264,224 |
| Vigo | 371,903 | 429,160 | 400,255 | 307,113 | 350,143 |
| Warren | 2,160 | ..... | ..... | ..... | ..... |
| Warrick | 66,638 | 89,059 | 96,134 | 84,009 | 58,946 |
| Small mines | ..... | 36,000 | 36,000 | 40,000 | 40,000 |
| Total | 2,845,057 | 3,305,737 | 2,973,474 | 3,345,174 | 3,791,851 |

| County. | 1894. | 1895. | 1896. | 1897. | Increase 1897. | Decrease 1897. |
|---|---|---|---|---|---|---|
| Clay | 890,714 | 1,223,186 | 1,232,435 | 925,727 | ..... | 306,708 |
| Daviess | 100,833 | 81,380 | 192,775 | 211,797 | 19,022 | ..... |
| Dubois | ..... | ..... | ..... | ..... | ..... | ..... |
| Fountain | 18,931 | ..... | 105,650 | 137,250 | 31,600 | ..... |
| Gibson | 19,021 | 1,940 | 24,775 | 41,409 | 16,634 | ..... |
| Greene | 300,474 | 409,080 | 290,046 | 448,873 | 158,827 | ..... |
| Knox | 28,862 | 26,443 | 30,500 | 36,752 | 6,252 | ..... |
| Martin | ..... | ..... | ..... | ..... | ..... | ..... |
| Owen | 7,575 | ..... | ..... | ..... | ..... | ..... |
| Parke | 356,265 | 479,609 | 339,677 | 434,007 | 94,330 | ..... |
| Perry | 30,696 | 18,960 | 26,227 | 23,712 | ..... | 2,515 |
| Pike | 173,556 | 232,950 | 201,417 | 248,043 | 46,626 | ..... |
| Spencer | 10,183 | 10,879 | 16,708 | 4,339 | ..... | 12,364 |
| Sullivan | 537,077 | 453,167 | 515,285 | 480,045 | ..... | 35,240 |
| Vanderburg | 175,881 | 192,710 | 170,755 | 182,800 | 12,045 | ..... |
| Vermilion | 296,222 | 306,000 | 347,166 | 321,560 | ..... | 25,606 |
| Vigo | 321,539 | 402,335 | 237,647 | 442,531 | 204,884 | ..... |
| Warren | ..... | ..... | ..... | ..... | ..... | ..... |
| Warrick | 120,092 | 121,253 | 138,721 | 176,324 | 37,603 | ..... |
| Small mines | 36,000 | 36,000 | 36,000 | 36,000 | ..... | ..... |
| Total | 3,423,921 | 3,995,892 | 3,905,779 | 4,151,169 | *a* 245,390 | ..... |

*a* Net increase.

The following table is of interest as showing the total amount and value of coal produced in the State from 1886 to 1897, and the total number of employees and average number of working days in each year since 1889:

*Statistics of coal production in Indiana since 1886.*

| Year. | Short tons. | Value. | Average price per ton. | Number of days active. | Average number of employees. |
|---|---|---|---|---|---|
| 1886 | 3,000,000 | $3,450,000 | $1.15 | ..... | ..... |
| 1887 | 3,217,711 | 4,324,604 | 1.03 | ..... | ..... |
| 1888 | 3,140,979 | 4,397,370 | 1.40 | ..... | ..... |
| 1889 | 2,845,057 | 2,887,852 | 1.02 | ..... | 6,448 |
| 1890 | 3,305,737 | 3,259,233 | .99 | 220 | 5,489 |
| 1891 | 2,973,474 | 3,070,918 | 1.03 | 190 | 5,879 |
| 1892 | 3,345,174 | 3,620,582 | 1.08 | 225 | 6,436 |
| 1893 | 3,791,851 | 4,055,372 | 1.07 | 201 | 7,644 |
| 1894 | 3,423,921 | 3,295,034 | .96 | 149 | 8,603 |
| 1895 | 3,995,892 | 3,642,623 | .91 | 189 | 8,530 |
| 1896 | 3,905,779 | 3,261,737 | .84 | 163 | 8,806 |
| 1897 | 4,151,169 | 3,472,348 | .84 | 176 | 8,886 |

In the following table is shown the total annual product of coal in the State since 1873:

*Product of coal in Indiana from 1873 to 1897.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1873 | 1,000,000 | 1886 | 3,000,000 |
| 1874 | 812,000 | 1887 | 3,217,711 |
| 1875 | 800,000 | 1888 | 3,140,979 |
| 1876 | 950,000 | 1889 | 2,845,057 |
| 1877 | 1,000,000 | 1890 | 3,305,737 |
| 1878 | 1,000,000 | 1891 | 2,973,474 |
| 1879 | 1,196,490 | 1892 | 3,345,174 |
| 1880 | 1,500,000 | 1893 | 3,791,851 |
| 1881 | 1,771,536 | 1894 | 3,423,921 |
| 1882 | 1,976,470 | 1895 | 3,995,892 |
| 1883 | 2,560,000 | 1896 | 3,905,779 |
| 1884 | 2,260,000 | 1897 | 4,151,169 |
| 1885 | 2,375,000 | | |

In accordance with the plan adopted in discussing the production in other States, the following tables are given to show the tendency in prices and the statistics of labor employed and average working time

by counties for such years as they have been obtained. They include only those counties whose annual product averages 10,000 tons or over:

*Average prices for Indiana coal since 1889 in counties averaging 10,000 tons or over*

| County. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|
| Clay | $1.14 | $1.01 | $1.15 | $1.25 |
| Daviess | 1.02 | 1.04 | 1.12 | 1.11 |
| Fountain | 1.29 | 1.00 | .99 | .89 |
| Gibson | ..... | ..... | ..... | ..... |
| Greene | .91 | .94 | .91 | .84 |
| Knox | ..... | ..... | ..... | .84 |
| Parke | 1.05 | 1.09 | 1.13 | 1.09 |
| Perry | 1.18 | 1.05 | 1.10 | .86 |
| Pike | .83 | .98 | .90 | .87 |
| Spencer | 1.15 | .96 | .88 | .80 |
| Sullivan | .94 | .94 | 1.01 | .89 |
| Vanderburg | 1.16 | 1.02 | 1.09 | 1.06 |
| Vermilion | .89 | 1.17 | .98 | .96 |
| Vigo | .88 | .80 | .80 | 1.14 |
| Warrick | ..... | ..... | .77 | .81 |
| The State | 1.02 | .99 | 1.03 | 1.08 |

| County. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Clay | $1.29 | $1.13 | $1.07 | $0.96 | $1.07 |
| Daviess | .97 | 1.03 | .94 | .87 | .91 |
| Fountain | 1.00 | 1.08 | ..... | .80 | .93 |
| Gibson | ..... | .78 | ..... | .75 | .75 |
| Greene | .83 | .96 | .69 | .77 | .74 |
| Knox | 1.10 | .84 | .98 | .78 | .82 |
| Parke | 1.16 | 1.07 | .98 | .87 | .88 |
| Perry | 1.13 | 1.12½ | 1.12 | 1.12 | 1.00 |
| Pike | .76 | .77 | .77 | .69 | .74 |
| Spencer | .84 | 1.03 | 1.01 | 1.34 | 1.15 |
| Sullivan | .88 | .82 | .84 | .67 | .64 |
| Vanderburg | 1.08 | .96 | 1.03 | 1.03 | .84 |
| Vermilion | .96 | .82 | .81 | .75 | .79 |
| Vigo | .95 | .95 | .78 | .70 | .63 |
| Warrick | .89 | .72 | .72 | .66 | .82 |
| The State | 1.07 | .96 | .91 | .84 | .84 |

*Statistics of labor employed in Indiana coal mines.*

| County. | 1889. | 1890. | | 1891. | |
|---|---|---|---|---|---|
| | Average number employed. | Average number employed. | Average number of days worked. | Average number employed. | Average number of days worked. |
| Clay | 2,592 | 2,179 | 218 | 2,346 | 181 |
| Daviess | 455 | 280 | 231 | 359 | 217 |
| Fountain | 41 | 48 | 260 | 252 | 40 |
| Gibson | 7 | ..... | ..... | ..... | ..... |
| Greene | 296 | 250 | 218 | 154 | 300 |
| Knox | 22 | ..... | ..... | ..... | ..... |
| Parke | 591 | 558 | 254 | 510 | 255 |
| Perry | 109 | 100 | 250 | 95 | 190 |
| Pike | 340 | 235 | 170 | 230 | 198½ |
| Spencer | 29 | 39 | 261 | 46 | 204 |
| Sullivan | 556 | 588 | 181 | 544 | 130½ |
| Vanderburg | 318 | 454 | 262 | 338 | 228½ |
| Vermilion | 276 | 307 | 244 | 380 | 147 |
| Vigo | 629 | 280 | 161 | 487 | 244 |
| Warrick | 85 | 131 | 222 | 161 | 199 |
| The State | 6,448 | 5,489 | 220 | 5,879 | 190 |

| County. | 1892. | | 1893. | | 1894. | |
|---|---|---|---|---|---|---|
| | Average number employed. | Average number of days worked. | Average number employed. | Average number of days worked. | Average number employed. | Average number of days worked. |
| Clay | 2,797 | 239 | 2,976 | 196 | 3,114 | 131 |
| Daviess | 403 | 224 | 553 | 213 | 350 | 116 |
| Fountain | 30 | 315 | 18 | 150 | 75 | 160 |
| Gibson | ..... | ..... | ..... | ..... | 36 | 143 |
| Greene | 335 | 227 | 391 | 203 | 576 | 141 |
| Knox | 28 | 138 | 37 | 183 | 64 | 153 |
| Parke | 639 | 228 | 1,091 | 202 | 1,065 | 135 |
| Perry | 88 | 227 | 100 | 198 | 93 | 168 |
| Pike | 160 | 163 | 365 | 211 | 348 | 148 |
| Spencer | 13 | 310 | 29 | 170 | 40 | 170 |
| Sullivan | 522 | 242 | 460 | 221½ | 885 | 152 |
| Vanderburg | 282 | 262 | 357 | 250 | 330 | 215 |
| Vermilion | 545 | 164 | 507 | 158 | 710 | 165 |
| Vigo | 491 | 217 | 579 | 217 | 740 | 196 |
| Warrick | 171 | 141 | 136 | 129 | 147 | 199 |
| The State | 6,436 | 225 | 7,644 | 201 | 8,603 | 149 |

*Statistics of labor employed in Indiana coal mines*—Continued.

| County. | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|
| | Average number employed. | Average number of days worked. | Average number employed. | Average number of days worked. | Average number employed. | Average number of days worked. |
| Clay | 3,319 | 195 | 3,290 | 171 | 2,682 | 169 |
| Daviess | 258 | 129 | 440 | 176 | 502 | 157 |
| Fountain | ..... | ..... | 122 | 240 | 175 | 220 |
| Gibson | ..... | ..... | 42 | 181 | 60 | 192 |
| Greene | 646 | 180 | 659 | 157 | 890 | 186 |
| Knox | 69 | 140 | 63 | 155 | 96 | 190 |
| Parke | 1,225 | 166 | 1,138 | 116 | 1,126 | 164 |
| Perry | 80 | 148 | 83 | 174 | 80 | 163 |
| Pike | 392 | 191 | 384 | 161 | 427 | 188 |
| Spencer | 61 | 129 | 50 | 157 | 20 | 141 |
| Sullivan | 607 | 185 | 724 | 186 | 913 | 147 |
| Vanderburg | 281 | 233 | 293 | 222 | 361 | 222 |
| Vermilion | 572 | 245 | 657 | 214 | 550 | 213 |
| Vigo | 869 | 187 | 674 | 116 | 767 | 173 |
| Warrick | 146 | 186 | 187 | 175 | 297 | 210 |
| The State | 8,530 | 189 | 8,806 | 163 | 8,886 | 176 |

## INDIAN TERRITORY.

Total product in 1897, 1,336,380 short tons; spot value, $1,787,358.

The coal product of the Indian Territory in 1897 was 30,266 short tons less than that of 1896, but with this exception was larger than any preceding year. The mines of the Territory were not affected by any labor disturbances, and the small decrease in output was due principally to the inability of operators to obtain cars for shipping the coal during the spring of the year, when the railroads were taxed to their utmost capacity in hauling cattle. Most of the Territory coal is shipped into Texas, and as the cattle shipments were made from the State, it was a difficult matter to secure the return of the empty coal cars in opposition to well-paying cattle freight.

There are six mines in the Territory in which mining machines are in use. The total number of machines in use in 1897 was 54, against 56 in 1896. The tonnage won by machines in 1897 was 263,811, against 191,585 the preceding year, an increase of 72,226 tons, or 38 per cent. Of the 54 machines in use in 1897, 39 were operated by compressed air and 15 by electricity.

The first production of coal reported from the Indian Territory was in 1885, in which year the total output was 500,000 short tons. It

increased with each succeeding year until 1893, when it reached 1,252,110 tons, a gain of 150 per cent in eight years. In 1894 the operatives in the Territory took part in the great strike which paralyzed the industry for several months, and the product fell off to 969,606 short tons, a decrease of 22 per cent. Production returned to about its normal proportions in 1895, but without a proportionate increase in value. The average selling price for Territory coal has shown a steadily declining tendency since 1893, when it was $1.79 per ton. In 1896 it had fallen to $1.40 per ton, and a further decline of 6 cents in 1897 brought it down to $1.34, a total decline in four years of 45 cents, or 25 per cent.

The following table exhibits the details of production during the past seven years:

*Coal product of the Indian Territory since 1891.*

| Distribution. | 1891. | 1892. | 1893. |
|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* |
| Loaded at mines for shipment | 1,026,932 | 1,156,603 | 1,197,468 |
| Sold to local trade and used by employees | 9,405 | 10,840 | 9,234 |
| Used at mines for steam and heat | 22,163 | 18,089 | 21,663 |
| Made into coke | 32,532 | 7,189 | 23,745 |
| Total | 1,091,032 | 1,192,721 | 1,252,110 |
| Total value | $1,897,037 | $2,043,479 | $2,235,209 |
| Average number of employees | 2,891 | 3,257 | 3,446 |
| Average number of days worked | 222 | 211 | 171 |

| Distribution. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Loaded at mines for shipment | 923,581 | 1,173,399 | 1,295,742 | 1,250,066 |
| Sold to local trade and used by employees | 4,632 | 3,070 | 12,648 | 9,068 |
| Used at mines for steam and heat | 30,878 | 21,935 | 45,560 | 47,501 |
| Made into coke | 10,515 | 12,781 | 12,696 | 29,745 |
| Total | 969,606 | 1,211,185 | 1,366,646 | 1,336,380 |
| Total value | $1,541,293 | $1,737,254 | $1,918,115 | $1,787,358 |
| Average number of employees | 3,101 | 3,212 | 3,549 | 3,168 |
| Average number of days worked | 157 | 164 | 170 | 176 |

*Coal product of Iowa in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Appanoose | 43 | 511,791 | 21,395 | 11,492 | 544,678 | $683,360 | $1.26 | 158 | 1,768 |
| Boone | 16 | 270,304 | 30,061 | 16,391 | 316,756 | 472,725 | 1.49 | 183 | 953 |
| Dallas, Greene | 5 | 979 | 7,517 | 1,128 | 9,624 | 17,433 | 1.81 | 152 | 61 |
| Jasper | 5 | 160,000 | 4,040 | 70 | 164,110 | 174,595 | 1.06 | 258 | 254 |
| Jefferson | 2 | ..... | 1,317 | ..... | 1,317 | 1,535 | 1.17 | 96 | 7 |
| Keokuk | 10 | 195,558 | 13,137 | 5,779 | 214,474 | 218,586 | 1.02 | 172 | 551 |
| Mahaska | 17 | 974,751 | 52,459 | 20,031 | 1,047,241 | 1,127,974 | 1.08 | 191 | 2,121 |
| Marion | 11 | a 84,093 | 5,068 | 3,862 | a 93,023 | 91,295 | .98 | 146 | 305 |
| Monroe | 8 | 415,903 | 6,781 | 10,836 | 433,520 | 437,490 | 1.01 | 188 | 840 |
| Polk | 20 | b 392,136 | 140,660 | 13,255 | b 546,051 | 696,682 | 1.28 | 180 | 1,556 |
| Story | 2 | ..... | 9,101 | ..... | 9,101 | 17,162 | 1.89 | 124 | 54 |
| Taylor | 3 | 7,000 | 1,400 | ..... | 8,400 | 14,800 | 1.76 | 157 | 30 |
| Van Buren | 4 | 4,800 | 3,576 | 20 | 8,396 | 10,519 | 1.25 | 210 | 22 |
| Wapello | 9 | 191,750 | 31,140 | 4,187 | 227,077 | 225,950 | 1.00 | 171 | 463 |
| Warren | 7 | 3,426 | 9,298 | 100 | 12,824 | 18,608 | 1.45 | 143 | 53 |
| Wayne | 2 | 38,429 | 3,713 | 590 | 42,732 | 54,407 | 1.27 | 153 | 182 |
| Webster | 18 | 116,899 | 13,780 | 4,025 | 134,704 | 189,901 | 1.40 | 190 | 452 |
| Small mines | ..... | ..... | 140,000 | ..... | 140,000 | 175,000 | ..... | ..... | ..... |
| Total | 182 | 3,367,819 | 494,443 | 91,766 | 3,954,028 | 4,628,022 | 1.17 | 178 | 9,672 |

a Includes 20 short tons made into coke.

b Includes 7 000 short tons made into coke.

*Coal product of Iowa in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Appanoose | 43 | 630,536 | 26,464 | 13,143 | 670,143 | $793,254 | $1.18 | 186 | 2,254 |
| Boone | 15 | 261,867 | 27,455 | 2,896 | 292,218 | 445,455 | 1.52 | 150 | 1,043 |
| Greene | 5 | 200 | 8,525 | 520 | 9,245 | 14,398 | 1.56 | 143 | 64 |
| Jasper | 4 | 172,580 | 2,732 | 4 | 175,316 | 201,530 | 1.15 | 205 | 256 |
| Keokuk | 8 | 280,732 | 6,011 | 2,735 | 289,478 | 304,316 | 1.05 | 196 | 572 |
| Mahaska | 16 | a 1,350,634 | 56,162 | 13,714 | 1,420,510 | 1,431,245 | 1.01 | 235 | 2,536 |
| Marion | 14 | 118,344 | 9,212 | 1,946 | 129,502 | 135,212 | 1.04 | 175 | 342 |
| Monroe | 6 | 479,226 | 5,723 | 12,882 | 497,831 | 498,557 | 1.00 | 229 | 986 |
| Polk | 20 | 314,558 | 161,528 | 13,050 | 489,136 | 604,041 | 1.23 | 204 | 1,221 |
| Story | 2 | 9,412 | 3,760 | ..... | 13,172 | 20,649 | 1.57 | 163 | 56 |
| Taylor | 2 | 8,406 | 2,305 | 15 | 10,726 | 19,134 | 1.78 | 196 | 42 |
| Wapello | 7 | 188,168 | 34,413 | 6,889 | 229,470 | 232,471 | 1.01 | 167 | 552 |
| Warren | 4 | ..... | 6,588 | 22 | 6,610 | 10,220 | 1.55 | 129 | 33 |
| Wayne | 2 | 48,348 | 8,054 | 594 | 56,996 | 74,570 | 1.31 | 194 | 191 |
| Webster | 12 | 152,915 | 14,370 | 1,614 | 168,899 | 238,319 | 1.41 | 211 | 520 |
| Dallas, Van Buren | 2 | 8,018 | 3,125 | 1,470 | 12,613 | 20,632 | 1.64 | 255 | 35 |
| Small mines | ..... | ..... | 140,000 | ..... | 140,000 | 175,000 | ..... | ..... | ..... |
| Total | 162 | a 4,023,944 | 516,427 | 71,494 | 4,611,865 | 5,219,503 | 1.13 | 201 | 10,703 |

a Including 22,633 tons made into coke.

*Strikes in the Iowa coal mines during 1897.*

| County. | Number of mines where strikes occurred. | Number of men on strike. | Average number of days idle. | Total number of working days lost. |
|---|---|---|---|---|
| Appanoose | 14 | 839 | 27 | 22,329 |
| Boone | 4 | 490 | 90 | 44,180 |
| Greene | 1 | 10 | 30 | 300 |
| Keokuk | 2 | 55 | 4 | 230 |
| Mahaska | 2 | 365 | 14 | 5,065 |
| Marion | 1 | 30 | 8 | 240 |
| Monroe | 2 | 428 | 40 | 17,220 |
| Polk | 13 | 959 | 40½ | 38,848 |
| Taylor | 1 | 15 | 12 | 180 |
| Wapello | 2 | 163 | 34 | 5,505 |
| Webster | 2 | 102 | 15 | 1,489 |
| The State | 44 | 3,456 | 39 | 135,586 |

The State is divided into three inspection districts, known, respectively, as the first or southern, the second or northeastern, and the third or northwestern. The following table shows the annual production according to districts since 1883:

*Total production of coal in Iowa, by districts, from 1883 to 1897, inclusive.*

| District. | 1883. | 1884. | 1885. | 1886. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| First | 1,231,444 | 1,165,803 | 1,294,971 | 1,416,165 |
| Second | 1,654,267 | 1,583,468 | 1,379,799 | 1,890,784 |
| Third | 1,571,829 | 1,621,295 | 1,337,805 | 1,008,830 |
| Total | 4,457,540 | 4,370,566 | 4,012,575 | 4,315,779 |

| District. | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| First | 1,598,062 | 1,712,443 | 1,497,685 | 1,536,978 |
| Second | 1,989,095 | 2,211,274 | 1,720,727 | 1,626,193 |
| Third | 886,671 | 1,028,723 | 876,946 | 718,568 |
| Small mines | ..... | ..... | ..... | 140,000 |
| Total | 4,473,828 | 4,952,440 | 4,095,358 | 4,021,739 |

| District. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| First | 1,229,512 | 1,398,793 | 1,505,205 | 1,654,112 |
| Second | 1,814,910 | 1,666,224 | 1,734,666 | 1,417,542 |
| Third | 641,073 | 713,474 | 592,358 | 755,599 |
| Small mines | 140,000 | 140,000 | 140,000 | 140,000 |
| Total | 3,825,495 | 3,918,491 | 3,972,229 | 3,967,253 |

| District. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| First | 1,681,927 | 1,371,967 | 1,607,038 | 235,071 | ..... |
| Second | 1,438,724 | 1,425,825 | 1,885,304 | 459,479 | ..... |
| Third | 895,423 | 1,016,236 | 979,523 | ..... | 36,713 |
| Small mines | 140,000 | 140,000 | 140,000 | ..... | ..... |
| Total | 4,156,074 | 3,954,028 | 4,611,865 | *a* 657,837 | ..... |

*a* Net increase.

The counties comprised in each district and the product of each county since 1883 are shown in the following table:

*Product of coal in the first inspection district of Iowa from 1883 to 1897, inclusive.*

| County. | 1883. | 1884. | 1885. | 1886. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Appanoose | 144,364 | 178,064 | 275,404 | 168,000 |
| Adams | 4,358 | 4,459 | 4,364 | 10,731 |
| Davis | 590 | 1,358 | 37,694 | 1,120 |
| Jefferson | 43,553 | 9,153 | 1,250 | 1,213 |
| Lucas | 546,360 | 460,017 | 492,750 | 594,450 |
| Marion | 101,903 | 108,735 | 112,012 | 158,697 |
| Monroe | 104,647 | 110,238 | 113,699 | 131,824 |
| Page | 838 | 1,130 | 2,037 | 1,736 |
| Taylor | 105 | 142 | 691 | 9,615 |
| Van Buren | 1,880 | 1,091 | 1,336 | 9,003 |
| Wapello | 266,360 | 269,607 | 210,461 | 265,564 |
| Warren | 14,367 | 15,374 | 14,364 | 26,132 |
| Wayne | 2,119 | 5,541 | 28,909 | 38,080 |
| Total | 1,231,444 | 1,165,803 | 1,294,971 | 1,416,165 |

| County. | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Appanoose | 179,593 | 235,495 | 285,194 | 284,560 |
| Adams | 22,233 | 21,075 | 13,457 | (*a*) |
| Cass | ..... | ..... | 280 | (*a*) |
| Davis | 2,016 | 2,016 | 3,825 | (*a*) |
| Jefferson | 11,645 | 10,514 | 8,123 | 351,600 |
| Lucas | 529,758 | 408,765 | 339,229 | |
| Marion | 238,218 | 258,330 | 145,180 | 153,506 |
| Monroe | 205,525 | 261,964 | 258,401 | 324,031 |
| Montgomery | ..... | ..... | 1,040 | (*a*) |
| Page | 1,993 | 3,842 | 2,768 | (*a*) |
| Taylor | 13,642 | 8,962 | 9,736 | (*a*) |
| Van Buren | 29,491 | 29,075 | 39,258 | 47,464 |
| Wapello | 304,722 | 426,042 | 359,199 | 341,932 |
| Warren | 27,772 | 19,155 | 14,515 | 8,470 |
| Wayne | 31,454 | 27,208 | 17,480 | 25,415 |
| Total | 1,598,062 | 1,712,443 | 1,497,685 | *b* 1,536,978 |

*a* Included in product of small mines.

*b* Exclusive of product of small mines.

*Product of coal in the first inspection district of Iowa from 1883 to 1897, inclusive*—Cont'd.

| County. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Appanoose | 409,725 | 411,984 | 489,920 | 667,271 |
| Adams | (a) | (a) | (a) | (a) |
| Cass | (a) | (a) | (a) | (a) |
| Davis | (a) | (a) | (a) | (a) |
| Jefferson<br>Lucas | 800 | 1,000 | 482 | 1,127 |
| Marion | 165,867 | 134,400 | 111,145 | 108,695 |
| Monroe | 393,227 | 507,106 | 570,905 | 505,164 |
| Montgomery | (a) | (a) | (a) | (a) |
| Page | (a) | (a) | (a) | (a) |
| Taylor | 10,500 | 15,204 | 10,990 | 14,780 |
| Van Buren | 36,166 | 28,946 | 22,867 | 23,619 |
| Wapello | 165,827 | 231,472 | 230,460 | 278,583 |
| Warren | 2,000 | 3,600 | 3,000 | 12,649 |
| Wayne | 45,000 | 62,078 | 65,436 | 42,224 |
| Total | b 1,229,512 | b 1,398,793 | b 1,505,205 | b 1,654,112 |

| County. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Appanoose | 588,438 | 544,678 | 670,143 | 125,465 | ..... |
| Adams | (a) | (a) | (a) | ..... | ..... |
| Cass | (a) | (a) | (a) | ..... | ..... |
| Davis | (a) | (a) | (a) | ..... | ..... |
| Jefferson<br>Lucas | 1,840 | 1,317 | (a) | ..... | 1,317 |
| Marion | 193,768 | 93,023 | 129,502 | 36,479 | ..... |
| Monroe | 559,982 | 433,520 | 497,831 | 64,311 | ..... |
| Montgomery | (a) | (a) | (a) | ..... | ..... |
| Page | (a) | (a) | (a) | ..... | ..... |
| Taylor | 14,062 | 8,400 | 10,726 | 2,326 | ..... |
| Van Buren | 9,896 | 8,396 | 5,760 | ..... | 2,636 |
| Wapello | 261,510 | 227,077 | 229,470 | 2,393 | ..... |
| Warren | 6,116 | 12,824 | 6,610 | ..... | 6,214 |
| Wayne | 46,315 | 42,732 | 56,996 | 14,264 | ..... |
| Total | b 1,681,927 | b 1,371,967 | 1,607,038 | c 235,071 | ..... |

a Included in product of small mines. b Exclusive of product of small mines. c Net increase.

*Product of coal in the second inspection district of Iowa from 1883 to 1897.*

| County. | 1883. | 1884. | 1885. | 1886. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Mahaska | 1,038,673 | 1,044,640 | 854,319 | 953,525 |
| Keokuk | 560,045 | 482,652 | 417,554 | 610,741 |
| Jasper | 51,389 | 51,896 | 101,276 | 320,358 |
| Scott | 4,160 | 4,280 | 6,650 | 3,360 |
| Marshall | ..... | ..... | ..... | 448 |
| Hardin | ..... | ..... | ..... | 2,240 |
| Muscatine | ..... | ..... | ..... | 112 |
| Total | 1,654,267 | 1,583,468 | 1,379,799 | 1,890,784 |

| County. | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Mahaska | 1,148,614 | 936,299 | 1,056,477 | 1,103,831 |
| Keokuk | 670,888 | 607,002 | 455,162 | 349,318 |
| Jasper | 159,083 | 308,200 | 199,152 | 173,044 |
| Scott | 9,670 | 10,170 | 9,446 | (*b*) |
| Marshall | 224 | ..... | ..... | ..... |
| Hardin | 504 | 1,120 | 490 | (*b*) |
| Muscatine | 112 | ..... | ..... | ..... |
| Total | 1,989,096 | *a* 2,211,274 | 1,720,727 | *c* 1,626,193 |

| County. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Mahaska | 1,231,405 | 1,141,131 | 1,419,930 | 1,152,988 |
| Keokuk | 316,303 | 361,233 | 152,097 | 142,750 |
| Jasper | 267,202 | 163,860 | 162,639 | 121,804 |
| Scott | (*b*) | (*b*) | (*b*) | (*b*) |
| Hardin | (*b*) | (*b*) | (*b*) | (*b*) |
| Total | *c* 1,814,910 | *c* 1,666,224 | *c* 1,734,666 | *c* 1,417,542 |

| County. | 1895. | 1896. | 1897. | Increase, 1897. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Mahaska | 1,016,623 | 1,047,241 | 1,420,510 | 373,269 |
| Keokuk | 266,394 | 214,474 | 289,478 | 75,004 |
| Jasper | 155,707 | 164,110 | 175,316 | 11,206 |
| Scott | (*b*) | (*b*) | (*b*) | ..... |
| Hardin | (*b*) | (*b*) | (*b*) | ..... |
| Total | *c* 1,438,724 | *c* 1,425,825 | *c* 1,885,304 | 459,479 |

*a* Includes 348,483 tons nut coal not included in county distribution.
*b* Included in product of small mines.
*c* Exclusive of product of small mines.

*Product of coal in the third inspection district of Iowa from 1883 to 1897.*

| County. | 1883. | 1884. | 1885. | 1886. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Boone | 523,019 | 529,842 | 513,174 | 330,366 |
| Dallas | 42,793 | 41,647 | 36,944 | 24,624 |
| Greene | 99,513 | 107,886 | 100,337 | 131,643 |
| Guthrie | ..... | 5,809 | 5,148 | 19,257 |
| Hamilton | 2,238 | 2,103 | 1,028 | 3,710 |
| Polk | 625,879 | 694,312 | 518,442 | 378,520 |
| Webster | 278,387 | 239,696 | 162,732 | 120,710 |
| Story | ..... | ..... | ..... | ..... |
| Total | 1,571,829 | 1,621,295 | 1,337,805 | 1,008,830 |

| County. | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Boone | 187,116 | 156,959 | 174,392 | 153,229 |
| Dallas | 45,270 | 54,457 | 67,055 | 33,466 |
| Greene | 118,601 | 122,127 | 51,438 | 45,192 |
| Guthrie | 20,502 | 20,922 | 12,275 | (*a*) |
| Hamilton | 7,469 | 7,257 | ..... | ..... |
| Polk | 341,705 | 336,749 | 434,047 | 367,852 |
| Webster | 163,768 | 178,881 | 137,739 | 118,829 |
| Story | 2,240 | 2,240 | ..... | ..... |
| Total | 886,671 | *b* 1,028,723 | 876,946 | *c* 718,568 |

| County. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Boone | 151,659 | 139,820 | 172,070 | 241,522 |
| Dallas | 48,710 | 26,550 | 13,461 | 10,201 |
| Greene | 53,215 | 43,360 | 18,000 | 5,220 |
| Guthrie | (*a*) | (*a*) | (*a*) | (*a*) |
| Hamilton | ..... | ..... | ..... | ..... |
| Polk | 309,467 | 388,590 | 271,731 | 395,647 |
| Webster | 78,022 | 115,154 | 117,096 | 103,009 |
| Story | ..... | ..... | ..... | ..... |
| Total | *c* 641,073 | *c* 713,474 | *c* 592,358 | *c* 755,599 |

*a* Included in product of small mines.
*b* Includes 149,131 tons nut coal not included in county distribution.
*c* Exclusive of product of small mines.

*Product of coal in the third inspection district of Iowa from 1883 to 1897*—Continued.

| County. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Boone | 268,422 | 316,756 | 292,218 | ..... | 24,538 |
| Dallas | 6,061 | 9,624 | 16,098 | 6,474 | ..... |
| Greene | 7,197 | | | | |
| Guthrie | 1,600 | ..... | ..... | ..... | ..... |
| Hamilton | ..... | ..... | ..... | ..... | ..... |
| Polk | 485,360 | 546,051 | 489,136 | ..... | 56,915 |
| Webster | 123,882 | 134,704 | 168,899 | 34,195 | ..... |
| Story | 2,901 | 9,101 | 13,172 | 4,071 | ..... |
| Total | *a* 895,423 | *a* 1,016,236 | *a* 979,523 | ..... | *b* 36,713 |

*a* Exclusive of product of small mines. *b* Net decrease.

The product in some of the earlier years in the history of coal mining has already been referred to. Below is given in tabular form the output in all the years for which figures are obtainable, with the value and average price per ton when known, and the statistics of labor employed, during the past nine years:

*Product of coal in Iowa from 1860 to 1897, inclusive.*

| Year. | Short tons. | Value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|
| 1860 | 48,263 | $92,180 | $1.91 | ..... | ..... |
| 1865 | 69,574 | ..... | ..... | ..... | ..... |
| 1866 | 99,320 | ..... | ..... | ..... | ..... |
| 1868 | 241,453 | ..... | ..... | ..... | ..... |
| 1870 | 283,467 | ..... | ..... | ..... | ..... |
| 1875 | 1,231,547 | 2,500,140 | 2.03 | ..... | ..... |
| 1880 | 1,461,166 | 2,507,453 | 1.72 | ..... | ..... |
| 1882 | 3,920,000 | ..... | ..... | ..... | ..... |
| 1883 | 4,457,540 | ..... | ..... | ..... | ..... |
| 1884 | 4,370,566 | ..... | ..... | ..... | ..... |
| 1885 | 4,012,575 | ..... | ..... | ..... | ..... |
| 1886 | 4,315,779 | 5,391,151 | 1.25 | ..... | ..... |
| 1887 | 4,473,828 | 5,991,735 | 1.34 | ..... | ..... |
| 1888 | 4,952,440 | 6,438,172 | 1.30 | ..... | ..... |
| 1889 | 4,095,358 | 5,426,509 | 1.33 | ..... | 9,247 |
| 1890 | 4,021,739 | 4,995,739 | 1.24 | 213 | 8,130 |
| 1891 | 3,825,495 | 4,807,999 | 1.27 | 224 | 8,124 |
| 1892 | 3,918,491 | 5,175,060 | 1.32 | 236 | 8,170 |
| 1893 | 3,972,229 | 5,110,460 | 1.30 | 204 | 8,863 |
| 1894 | 3,967,253 | 4,997,939 | 1.26 | 170 | 9,995 |
| 1895 | 4,156,074 | 4,982,102 | 1.20 | 189 | 10,066 |
| 1896 | 3,954,028 | 4,628,022 | 1.17 | 178 | 9,672 |
| 1897 | 4,611,865 | 5,219,503 | 1.13 | 201 | 10,703 |

It will be seen from the above table that the greatest range in the average price per ton during the past twelve years has been 21 cents; the highest price being $1.34, in 1887, and the lowest $1.13, in 1897.

In the preceding tables the product for a series of years, by counties, has been given. In the following tables will be found the average price per ton for a period of nine years, and the statistics of labor and working time in counties producing 10,000 tons or over:

*Average prices for Iowa coal since 1889, in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Appanoose | $1.32 | $1.38 | $1.39 | $1.51 | $1.51 | $1.30 | $1.25 | $1.26 | $1.18 |
| Boone | 1.86 | 1.82 | 1.86 | 1.80 | 1.87 | 1.60 | 1.67 | 1.49 | 1.52 |
| Dallas | 1.66 | 1.70 | 1.60 | 1.71 | 1.82 | 1.60 | ..... | ..... | ..... |
| Greene | 1.74 | 1.63 | 1.40 | 1.76 | 2.00 | 2.00 | ..... | ..... | ..... |
| Jasper | 1.42 | 1.11 | 1.44 | 1.28 | 1.28 | 1.75 | 1.26 | 1.06 | 1.15 |
| Keokuk | 1.25 | 1.31 | 1.32 | 1.28 | 1.21 | 1.14 | 1.04 | 1.02 | 1.05 |
| Lucas | 1.23 | 1.25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Mahaska | 1.16 | 1.06 | 1.06 | 1.15 | 1.11 | 1.18 | 1.12 | 1.08 | 1.01 |
| Marion | 1.28 | 1.26 | 1.16 | 1.17 | 1.21 | 1.05 | 1.01 | .98 | 1.04 |
| Monroe | 1.16 | 1.21 | 1.21 | 1.26 | 1.12 | 1.09 | 1.02 | 1.01 | 1.00 |
| Polk | 1.59 | 1.49 | 1.50 | 1.57 | 1.73 | 1.50 | 1.40 | 1.28 | 1.23 |
| Taylor | 2.07 | ..... | 2.15 | 2.00 | 2.02 | 1.85 | 1.89 | ..... | 1.78 |
| Van Buren | 1.39 | 1.29 | 1.29 | 1.32 | 1.36 | 1.37 | 1.37 | ..... | ..... |
| Wapello | 1.13 | 1.10 | 1.24 | 1.29 | 1.27 | 1.09 | 1.12 | 1.00 | 1.01 |
| Warren | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.45 | ..... |
| Wayne | 1.47 | 1.25 | 1.52 | 1.49 | 1.47 | 1.50 | 1.31 | 1.27 | 1.31 |
| Webster | 1.63 | 1.54 | 1.71 | 1.61 | 1.67 | 1.64 | 1.32 | 1.40 | 1.41 |
| The State | 1.33 | 1.24 | 1.27 | 1.32 | 1.30 | 1.26 | 1.20 | 1.17 | 1.13 |

*Statistics of labor employed and working time at Iowa coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Appanoose | 1,080 | 165 | 1,419 | 207 | 1,213 | 184 | 1,793 | 151 |
| Boone | 465 | 191 | 484 | 196 | 534 | 189 | 577 | 208 |
| Dallas | 130 | 207 | 140 | 210 | 89 | 242 | 55 | 159 |
| Greene | 121 | 209 | 120 | 185 | 120 | 214 | 60 | 150 |
| Jasper | 335 | 246 | 416 | 256 | 426 | 274 | 284 | 253 |
| Keokuk | 1,018 | 184 | 795 | 204 | 610 | 285 | 528 | 155 |
| Lucas | 324 | 298 | ..... | ..... | ..... | ..... | ..... | ..... |
| Mahaska | 1,673 | 258 | 1,815 | 263 | 1,818 | 238 | 2,209 | 258 |
| Marion | 269 | 265 | 394 | 222 | 267 | 244 | 292 | 193 |
| Monroe | 735 | 197 | 806 | 203 | 1,112 | 233 | 1,103 | 214 |
| Polk | 700 | 243 | 779 | 239 | 938 | 268 | 697 | 211 |
| Taylor | ..... | ..... | 35 | 241 | 54 | 223 | 29 | 228 |
| Van Buren | 108 | 280 | 85 | 207 | 92 | 226 | 69 | 178 |
| Wapello | 773 | 159 | 421 | 214 | 445 | 260 | 603 | 174 |
| Wayne | 60 | 180 | 130 | 205 | 140 | 232 | 155 | 205 |
| Webster | 307 | 182 | 273 | 182 | 302 | 247 | 391 | 194 |
| The State. | 8,130 | 213 | 8,124 | 224 | 8,170 | 236 | 8,863 | 204 |

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Appanoose | 2,254 | 153 | 2,323 | 141 | 1,768 | 158 | 2,254 | 186 |
| Boone | 842 | 169 | 977 | 191 | 953 | 183 | 1,043 | 150 |
| Dallas | 43 | 172 | ..... | ..... | ..... | ..... | ..... | ..... |
| Greene | 19 | 213 | ..... | ..... | ..... | ..... | ..... | ..... |
| Jasper | 177 | 204 | 278 | 242 | 254 | 258 | 256 | 205 |
| Keokuk | 551 | 128 | 563 | 167 | 551 | 172 | 572 | 196 |
| Mahaska | 2,396 | 199 | 2,144 | 208 | 2,121 | 191 | 2,536 | 235 |
| Marion | 329 | 121 | 471 | 200 | 305 | 146 | 342 | 175 |
| Monroe | 1,212 | 172 | 1,037 | 216 | 840 | 188 | 986 | 229 |
| Polk | 944 | 184 | 959 | 242 | 1,556 | 180 | 1,221 | 204 |
| Taylor | 52 | 212 | 38 | 236 | ..... | ..... | 42 | 196 |
| Van Buren | 78 | 174 | 31, | 193 | ..... | ..... | ..... | ..... |
| Wapello | 541 | 167 | 541 | 183 | 463 | 171 | 552 | 167 |
| Warren | ..... | ..... | ..... | ..... | 53 | 143 | ..... | ..... |
| Wayne | 140 | 121 | 155 | 126 | 182 | 153 | 191 | 194 |
| Webster | 378 | 155 | 444 | 173 | 452 | 190 | 520 | 211 |
| The State. | 9,995 | 170 | 10,066 | 189 | 9,672 | 178 | 10,703 | 201 |

## KANSAS.

Total product in 1897, 3,054,012 short tons; spot value, $3,602,326.

Kansas ranks third among the coal-producing States west of the Mississippi River, Iowa being first and Colorado second. The product of the State in 1897 shows a gain over 1896 of 169,211 tons, and was the largest output ever won except that of 1894, when coal mining in Kansas received a stimulus from the general strike of that year, which cut off the supply from other States and enabled the operators in Kansas to increase their production to a total of 3,388,251 short tons.

The use of mining machines did not have any appreciable effect upon the tonnage, as only one machine was in use, by which 4,500 short tons were mined. This is the first machine-mined product reported in the State. There was only one insignificant attempt at striking among the coal miners in Kansas during 1897. This was at the mines of Arnott & Co., Crawford County, where 120 men were idle the last four days of November. Kansas was fortunate in another particular, being one of the seven States in which the average price of the product increased over the previous year. It is worthy of note that of these seven States five were west of the Mississippi River. Two of them were on the Pacific coast (California and Oregon), and two (Colorado and Montana) belong to the Rocky Mountain system. Kansas was the only State contained in the western field (embracing the coal-producing area on the western slope of the Mississippi River from Iowa to Texas), in which there was an advance in price. Of the States east of the Mississippi River, the average price in Georgia advanced 1 cent, and that of Kentucky 2 cents. The average price in Kansas advanced 3 cents, which meant a difference of about $90,000 in the receipts to the operators over and above the increase in value which would have been realized if the same price had obtained as in 1896. The total gain in value over 1896 was $307,294.

The details of production in 1896 and 1897 are shown in the following tables:

*Coal product of Kansas in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Cherokee | 22 | 958,720 | 10,737 | 14,460 | 1,215 | 985,132 | $1,206,022 | $1.23 | 179 | 1,969 |
| Crawford | 23 | 1,237,254 | 12,287 | 21,893 | ..... | 1,271,434 | 1,229,691 | .97 | 144 | 2,966 |
| Franklin | 6 | 2,000 | 10,811 | 50 | ..... | 12,861 | 23,092 | 1.80 | 165 | 59 |
| Leavenworth | 3 | 187,594 | 70,169 | 26,937 | ..... | 284,700 | 368,825 | 1.30 | 242 | 1,054 |
| Linn | 4 | 11,771 | 2,763 | ..... | ..... | 14,534 | 14,176 | .97 | 113 | 54 |
| Osage | 35 | 165,440 | 24,947 | 561 | ..... | 190,948 | 324,250 | 1.65 | 141 | 992 |
| Atchison / Labette | 3 | ..... | 5,192 | ..... | ..... | 5,192 | 8,976 | 1.73 | 248 | 33 |
| Small mines | ..... | ..... | 120,000 | ..... | ..... | 120,000 | 120,000 | 1.00 | ..... | ..... |
| Total | 96 | 2,562,779 | 256,906 | 63,901 | 1,215 | 2,884,801 | 3,295,032 | 1.15 | 168 | 7,127 |

In the following table is shown the total product of the State since 1885, by counties, with the increases and decreases during 1897 as compared with 1896:

*Coal product of Kansas since 1885, by counties.*

[Short tons.]

| County. | 1885. | 1886. | 1887. | 1888. | 1889. |
|---|---|---|---|---|---|
| Atchison | ..... | ..... | ..... | ..... | ..... |
| Cherokee | 371,930 | 375,000 | 385,262 | 450,000 | 549,873 |
| Coffey | ..... | ..... | ..... | ..... | 18,272 |
| Crawford | 221,741 | 250,000 | 298,049 | 425,000 | 827,159 |
| Franklin | 14,518 | 15,000 | 18,080 | 25,000 | 37,771 |
| Labette | ..... | ..... | ..... | ..... | 2,541 |
| Leavenworth | 120,561 | 160,000 | 195,480 | 210,000 | 245,616 |
| Linn | 5,556 | 8,900 | 12,400 | 17,500 | 25,345 |
| Osage | 370,552 | 380,000 | 393,608 | 415,000 | 446,018 |
| Small mines | 107,199 | 211,100 | 294,000 | 307,500 | 68,448 |
| Total | 1,212,057 | 1,400,000 | 1,596,879 | 1,850,000 | 2,221,043 |

| County. | 1890. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|---|
| Atchison | ..... | ..... | ..... | ..... | 3,500 |
| Cherokee | 724,861 | 832,289 | 825,531 | 697,521 | 948,142 |
| Coffey | 12,200 | 1,218 | 3,664 | 1,720 | 475 |
| Crawford | 900,464 | 997,759 | 1,309,246 | 1,195,868 | 1,554,253 |
| Franklin | 9,045 | 10,277 | 11,150 | 11,768 | 17,418 |
| Labette | 4,000 | 800 | 800 | 800 | 440 |
| Leavenworth | 319,866 | 380,142 | 330,166 | 309,237 | 395,967 |
| Linn | 10,474 | 38,934 | 43,913 | 46,464 | 25,867 |
| Osage | 179,012 | 355,286 | 372,806 | 279,168 | 322,189 |
| Small mines | 100,000 | 100,000 | 110,000 | 110,000 | 120,000 |
| Total | 2,259,922 | 2,716,705 | 3,007,276 | 2,652,546 | 3,388,251 |

| County. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| Atchison | 1,200 | 4,592 | 7,250 | 2,658 | ..... |
| Cherokee | 918,944 | 985,132 | 1,004,921 | 19,789 | ..... |
| Coffey | 120 | ..... | ..... | ..... | ..... |
| Crawford | 1,354,614 | 1,271,434 | 1,352,923 | 81,489 | ..... |
| Douglas | ..... | ..... | 339 | 339 | ..... |
| Franklin | 17,047 | 12,861 | 5,140 | ..... | 7,721 |
| Labette | 250 | 600 | 250 | ..... | 350 |
| Leavenworth | 259,060 | 284,700 | 366,362 | 81,662 | ..... |
| Linn | 14,051 | 14,534 | 27,432 | 12,898 | ..... |
| Osage | 241,584 | 190,948 | 169,395 | ..... | 21,553 |
| Small mines | 120,000 | 120,000 | 120,000 | ..... | ..... |
| Total | 2,926,870 | 2,884,801 | 3,054,012 | *a* 169,211 | ..... |

*a* Net increase.

In the preceding table the output by counties has been shown. The following tables indicate the tendency of prices for such years as they have been obtained, and the statistics of labor employed, together with the average working time:

*Average prices for Kansas coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Cherokee | $1.20 | $1.22 | $1.19 | $1.22 | $1.15 | $1.13 | $1.22 | $1.23 | $1.21 |
| Crawford | 1.20 | 1.24 | 1.09 | 1.08 | 1.10 | 1.07 | 1.02 | .97 | 1.07 |
| Franklin | 2.18 | 2.00 | 1.90 | 1.85 | 1.84 | 1.88 | 1.84 | 1.80 | ..... |
| Leavenworth | 1.69 | 1.60 | 1.40 | 1.60 | 1.55 | 1.49 | 1.49 | 1.30 | 1.32 |
| Linn | 1.32 | 1.34 | 1.23 | 1.27 | 1.22 | 1.20 | 1.10 | .97 | 1.07 |
| Osage | 2.03 | 1.35 | 2.04 | 2.04 | 1.85 | 1.89 | 1.45 | 1.65 | 1.59 |
| The State. | 1.48 | 1.30 | 1.31 | 1.31½ | 1.27 | 1.23 | 1.20 | 1.15 | 1.18 |

*Statistics of labor employed and working time at Kansas coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Cherokee | 1,413 | 186 | 1,609 | 180 | 1,777 | 183 | 1,978 | 106 |
| Crawford | 1,447 | 198 | 1,785 | 202 | 2,234 | 213 | 2,883 | 163 |
| Franklin | 47 | 224 | 48 | 207 | 57 | 180 | 57 | 162 |
| Leavenworth | 745 | 273 | 1,073 | 245 | 1,020 | 247 | 1,145 | 208 |
| Linn | 60 | 164 | 94 | 236 | 115 | 237 | 136 | 194 |
| Osage | 804 | 209 | 1,581 | 270 | 1,312 | 202 | 1,100 | 145 |
| The State. | 4,523 | 210 | 6,201 | 222 | 6,559 | 208 | 7,310 | 147 |

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Cherokee | 1,834 | 143 | 1,982 | 155 | 1,969 | 179 | 1,941 | 196 |
| Crawford | 2,723 | 167 | 3,098 | 161 | 2,966 | 144 | 2,520 | 198 |
| Franklin | 87 | 147 | 54 | 192 | 59 | 165 | ..... | ..... |
| Leavenworth | 1,406 | 197 | 1,019 | 182 | 1,054 | 242 | 1,067 | 243 |
| Linn | 132 | 91 | 71 | 115 | 54 | 113 | 72 | 218 |
| Osage | 1,129 | 159 | 1,231 | 145 | 992 | 141 | 975 | 122 |
| The State. | 7,339 | 164 | 7,482 | 159 | 7,127 | 168 | 6,639 | 194 |

## KENTUCKY.

Total product in 1897, 3,602,097 short tons; spot value, $2,828,329.

An increase of 268,619 short tons in the product of 1897 as compared with that of 1896 makes the total output of the State last year the largest in its history. The increased production was due to the ability of Kentucky operators to supply a portion of the demand created by the miners' strike in the competitive fields of Pennsylvania, Ohio, Indiana, and Illinois. While Kentucky miners were somewhat disaffected, the strike was not general throughout the State, and in cases where the men went out the strike did not begin until August 1, so that the Kentucky operators had the benefit of nearly thirty days during which the strike was on in other States.

To this condition is also probably due the slight advance of 1 cent in the average price per ton obtained for the product, although there were a number of counties in which the price fell off, and had it not been for the increased demand for Kentucky coal created by the strike the value would probably have shown a considerable decrease.

*Strikes in Kentucky coal mines in 1897.*

| County. | Number of mines where strikes occurred. | Number of men on strike. | Average number of days idle. | Total number of working days lost. |
|---|---|---|---|---|
| Bell | 3 | 230 | 16 | 3,650 |
| Carter | 2 | 152 | 23 | 3,552 |
| Hopkins | 1 | 58 | 12 | 696 |
| Knox | 1 | 260 | 136 | 35,360 |
| Laurel | 10 | 658 | 41 | 26,808 |
| Lee | 2 | 35 | 51 | 1,770 |
| McLean | 1 | 40 | 26 | 1,040 |
| Muhlenberg | 2 | 155 | 30 | 4,670 |
| Ohio | 1 | 40 | 40 | 1,600 |
| Pulaski | 2 | 190 | 226 | 42,930 |
| Whitley | 8 | 1,000 | 188 | 187,575 |
| The State | 33 | 2,818 | 110 | 309,651 |

Kentucky is, comparatively, one of the most advanced States in the use of mining machines, 36 per cent of the product in 1897 being won in this way. Machine-mined coal amounted to 44 per cent of the product in Montana, but the amount was less than 60 per cent of that in Kentucky. Practically the entire output of Alaska is won by machines, but the entire product is only 18,000 tons, and with these two exceptions no other State in the Union has so large a percentage of machine-mined coal as Kentucky. Three States only produce more

coal by machines than Kentucky, and these are Pennsylvania, Illinois, and Ohio, three of the four most important producing States, while Kentucky is ninth in rank.

Kentucky stands alone in one particular among the coal-producing States. Two of the great fields, the Appalachian and the Central, contribute to the coal product of Kentucky, the eastern part of the State being embraced in the area covered by the former, and the southern extremity of the Central or Illinois field is found in the western counties. The counties whose product is included in that of the Appalachian system are Bell, Boyd, Breathitt, Carter, Greenup, Johnson, Knox, Laurel, Lawrence, Lee, Pulaski, Rockcastle, and Whitley, and the counties comprised in the Western field are Butler, Christian, Daviess, Hancock, Henderson, Hopkins, McLean, Muhlenberg, Ohio, Union, and Webster. All of the increase in product in 1897 was from the Western field, the increased production in that portion of the State overcoming a loss of nearly 75,000 tons in the eastern counties and making a net gain of 268,619 short tons. Whitley County, the most important of the eastern counties, and usually the second in the State, had an independent strike of its own in 1897. Eight of the twelve mines in the county were idle from May until November, and 1,000 of the 1,298 men employed in the mines were idle an average of six months. The product of the county fell off in consequence 187,089 short tons, which was offset by an increase in Hopkins County, of the Western field, amounting to 199,230 short tons.

The total product of the eastern field in 1897 was 1,411,897 short tons, against 1,486,016 short tons in 1896, a loss of 74,119 short tons, while the product of the western field increased from 1,847,462 short tons to 2,190,200 short tons, a gain of 342,738, making, as previously stated, a net gain of 268,619 short tons.

The details of production in the last two years are as follows:

*Coal product of Kentucky in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bell | 8 | 69,094 | 3,412 | 757 | 16,271 | 89,534 | $130,026 | $1.45 | 175 | 331 |
| Boyd | 2 | 118,439 | 1,583 | 1,000 | ..... | 121,022 | 96,818 | .80 | 249 | 232 |
| Carter | 6 | 135,440 | 280 | 346 | ..... | 136,066 | 115,354 | .85 | 221 | 360 |
| Hancock | 3 | 16,802 | 800 | 240 | ..... | 17,842 | 27,536 | 1.54 | 178 | 99 |
| Henderson | 6 | 92,417 | 23,742 | 3,381 | ..... | 119,540 | 92,159 | .77 | 132 | 265 |
| Hopkins | 12 | 710,759 | 24,610 | 15,833 | 25,980 | 777,182 | 520,189 | .67 | 191 | 1,292 |
| Johnson | 2 | 6,762 | ..... | ..... | ..... | 6,762 | 18,596 | 2.75 | 238 | 64 |
| Knox | 5 | 211,176 | 1,874 | 3,990 | ..... | 217,040 | 145,916 | .67 | 247 | 436 |
| Laurel | 13 | 285,724 | 1,331 | 1,435 | ..... | 288,494 | 234,865 | .81 | 142 | 826 |
| Lee | 3 | 9,697 | 100 | 50 | ..... | 9,847 | 9,847 | 1.00 | 58 | 156 |
| Muhlenberg | 8 | 247,331 | 4,819 | 4,118 | ..... | 256,268 | 178,272 | .70 | 129 | 569 |
| Ohio | 8 | 353,867 | 6,158 | 8,069 | ..... | 368,094 | 226,008 | .61 | 163 | 721 |
| Pulaski | 5 | 71,414 | 289 | 834 | ..... | 72,537 | 71,875 | .99 | 118 | 270 |
| Union | 6 | 88,312 | 9,595 | 2,687 | 3,528 | 104,122 | 86,687 | .83 | 166 | 245 |
| Webster | 4 | 39,273 | 10,034 | 1,231 | ..... | 50,538 | 37,108 | .73 | 140 | 108 |
| Whitley | 11 | 420,296 | 4,150 | 4,534 | ..... | 428,980 | 401,066 | .93 | 145 | 1,196 |
| Breathitt, Greenup, Lawrence | 3 | 46,307 | 477 | 3,950 | ..... | 50,734 | 41,605 | .82 | 125 | 153 |
| Butler, Christian | 3 | 34,216 | 5,562 | 1,790 | ..... | 41,568 | 43,046 | 1.04 | 150 | 161 |
| Daviess, McLean | 4 | 23,029 | 3,081 | 1,198 | ..... | 27,308 | 19,833 | .73 | 136 | 65 |
| Small mines. | ..... | ..... | 150,000 | ..... | ..... | 150,000 | 187,500 | ..... | ..... | ..... |
| Total | 112 | 2,980,355 | 251,897 | 55,447 | 45,779 | 3,333,478 | 2,684,306 | .78 | 165 | 7,549 |

*Coal product of Kentucky in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bell | 7 | 99,720 | 2,075 | 1,466 | ..... | 103,261 | $146,409 | $1.42 | 255 | 269 |
| Boyd | 2 | 89,522 | 101,596 | 1,420 | ..... | 192,538 | 137,760 | .72 | 264 | 325 |
| Butler | 2 | 11,355 | 10,452 | 40 | ..... | 21,847 | 19,009 | .87 | 143 | 85 |
| Carter | 7 | 94,377 | 28,414 | 1,555 | ..... | 124,346 | 114,416 | .92 | 221 | 406 |
| Hancock | 3 | 16,566 | 832 | 304 | ..... | 17,702 | 26,818 | 1.51 | 161 | 97 |
| Henderson | 5 | 77,557 | 27,240 | 2,390 | ..... | 107,187 | 93,884 | .88 | 214 | 215 |
| Hopkins | 8 | 887,146 | 21,997 | 16,464 | 50,805 | 976,412 | 631,016 | .65 | 208 | 1,414 |
| Johnson | 2 | 8,911 | 630 | ..... | ..... | 9,541 | 24,422 | 2.56 | 178 | 68 |
| Knox | 5 | 153,750 | 1,505 | 3,190 | ..... | 158,445 | 118,004 | .74 | 169 | 382 |
| Laurel | 14 | 346,967 | 15,254 | 2,086 | ..... | 364,307 | 298,957 | .82 | 195 | 879 |
| Lee | 3 | 34,556 | 1,055 | 100 | ..... | 35,711 | 36,997 | 1.04 | 192 | 61 |
| McLean | 2 | 32,360 | 500 | 500 | ..... | 33,360 | 23,720 | .71 | 246 | 70 |
| Muhlenberg | 8 | 252,170 | 13,860 | 4,730 | ..... | 270,760 | 183,841 | .68 | 171 | 632 |
| Ohio | 8 | 452,001 | 6,930 | 7,364 | ..... | 466,295 | 301,131 | .65 | 192 | 745 |
| Pulaski, Rockcastle | 6 | 59,415 | 610 | 425 | ..... | 60,450 | 60,130 | .99 | 104 | 338 |
| Union | 5 | 110,885 | 10,003 | 1,980 | 4,028 | 126,896 | 89,909 | .71 | 158 | 344 |
| Webster | 4 | 60,310 | 4,017 | 1,655 | ..... | 65,982 | 46,622 | .71 | 171 | 129 |
| Whitley | 12 | 235,272 | 3,645 | 2,974 | ..... | 241,891 | 222,542 | .92 | 104 | 1,298 |
| Breathitt, Christian, Daviess | 3 | 21,953 | 3,100 | 1,200 | ..... | 26,253 | 27,743 | 1.06 | 125 | 97 |
| Greenup, Lawrence | 3 | 43,339 | 384 | 5,190 | ..... | 48,913 | 37,499 | .77 | 156 | 129 |
| Small mines | ..... | ..... | 150,000 | ..... | ..... | 150,000 | 187,500 | ..... | ..... | ..... |
| Total | 109 | 3,088,132 | 404,099 | 55,033 | 54,833 | 3,602,097 | 2,828,329 | .79 | 178 | 7,983 |

The following table exhibits the annual product of the State since 1873:

*Annual coal product of Kentucky since 1873.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1873 | 300,000 | 1886 | 1,550,000 |
| 1874 | 360,000 | 1887 | 1,933,185 |
| 1875 | 500,000 | 1888 | 2,570,000 |
| 1876 | 650,000 | 1889 | 2,399,755 |
| 1877 | 850,000 | 1890 | 2,701,496 |
| 1878 | 900,000 | 1891 | 2,916,069 |
| 1879 | 1,000,000 | 1892 | 3,025,313 |
| 1880 | 1,000,000 | 1893 | 3,007,179 |
| 1881 | 1,100,000 | 1894 | 3,111,192 |
| 1882 | 1,300,000 | 1895 | 3,357,770 |
| 1883 | 1,650,000 | 1896 | 3,333,478 |
| 1884 | 1,550,000 | 1897 | 3,602,097 |
| 1885 | 1,600,000 | | |

Since 1889 the product, by counties, has been as follows:

*Coal product of Kentucky since 1889, by counties.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Bell | 20,095 | ..... | 15,693 | 7,971 | 43,671 |
| Boyd | 163,124 | *a* 191,600 | 179,350 | 194,470 | 162,706 |
| Butler | 6,489 | *b* 44,931 | 12,871 | 18,951 | 22,719 |
| Carter | 172,776 | 179,379 | 145,937 | 139,351 | 105,844 |
| Christian | 27,281 | ..... | 34,060 | 47,895 | 34,560 |
| Daviess | 30,870 | ..... | 6,711 | 8,064 | 7,546 |
| Greenup | 632 | ..... | ..... | ..... | 1,964 |
| Hancock | 21,588 | ..... | 16,815 | 13,393 | 5,000 |
| Henderson | 65,682 | *c* 126,640 | 124,021 | 80,661 | 103,639 |
| Hopkins | 555,119 | 604,307 | 680,386 | 730,879 | 713,809 |
| Johnson | 32,347 | 21,222 | 21,522 | 24,543 | 6,205 |
| Knox | 48,703 | 90,000 | 100,000 | 106,031 | 161,986 |
| Laurel | 280,451 | 291,178 | 308,242 | 241,129 | 193,622 |
| Lawrence | 79,787 | ..... | 80,848 | 97,000 | 95,232 |
| Lee | ..... | ..... | ..... | ..... | ..... |
| McLean | 35,177 | ..... | 25,000 | ..... | ..... |
| Muhlenberg | 206,855 | 240,983 | 260,315 | 277,865 | 290,270 |
| Ohio | 246,253 | 267,736 | 322,411 | 310,289 | 312,658 |
| Pulaski | 84,363 | ..... | 15,810 | 10,990 | 52,897 |
| Rockcastle | 1,432 | ..... | ..... | 9,774 | 9,010 |
| Union | 56,556 | 67,763 | 86,678 | 127,225 | 158,194 |
| Webster | 32,729 | *d* 133,216 | 33,883 | 38,207 | 37,999 |
| Whitley | 184,874 | 262,541 | 265,516 | 340,615 | 337,648 |
| Small mines | 46,572 | 180,000 | 180,000 | 200,000 | 150,000 |
| Total | 2,399,755 | 2,701,496 | 2,916,069 | 3,025,313 | 3,007,179 |

*a* Includes Pulaski.
*b* Includes Christian, Crittenden, and Daviess.
*c* Includes Hancock and McLean.
*d* Includes Lawrence.

*Coal product of Kentucky since 1889, by counties*—Continued.

| County. | 1894. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Bell | 63,022 | 79,374 | 89,534 | 103,261 | 13,727 | ..... |
| Boyd | 111,659 | 170,443 | 121,022 | 192,538 | 71,516 | ..... |
| Breathitt | ..... | ..... | 2,406 | 10,053 | 7,647 | ..... |
| Butler | 19,982 | 24,501 | 28,444 | 21,847 | ..... | 6,597 |
| Carter | 85,266 | 102,029 | 136,066 | 124,346 | ..... | 11,720 |
| Christian | 38,836 | 22,159 | 13,124 | 13,000 | ..... | 124 |
| Daviess | 10,353 | 12,898 | 3,232 | 3,200 | ..... | 32 |
| Greenup | 1,573 | 1,403 | 854 | 852 | ..... | 2 |
| Hancock | 35,571 | 30,569 | 17,842 | 17,702 | ..... | 140 |
| Henderson | 80,074 | 79,113 | 119,540 | 107,187 | ..... | 12,353 |
| Hopkins | 811,759 | 788,436 | 777,182 | 976,412 | 199,230 | ..... |
| Johnson | 16,902 | 10,679 | 6,762 | 9,541 | 2,779 | ..... |
| Knox | 72,858 | 185,734 | 217,040 | 158,445 | ..... | 58,595 |
| Laurel | 261,177 | 233,638 | 288,494 | 364,307 | 75,813 | ..... |
| Lawrence | 86,497 | 55,913 | 47,474 | 48,061 | 587 | ..... |
| Lee | 49,527 | 43,313 | 9,847 | 35,711 | 25,864 | ..... |
| McLean | 15,354 | 21,834 | 24,076 | 33,360 | 9,284 | ..... |
| Muhlenberg | 269,580 | 267,353 | 256,268 | 270,760 | 14,492 | ..... |
| Ohio | 348,937 | 386,903 | 368,094 | 466,295 | 98,201 | ..... |
| Pulaski | 51,665 | 81,188 | 72,537 | 47,847 | ..... | 24,690 |
| Rockcastle | 800 | 4,475 | ..... | 12,603 | 12,603 | ..... |
| Union | 134,585 | 100,616 | 104,122 | 126,896 | 22,774 | ..... |
| Webster | 41,934 | 49,896 | 50,538 | 65,982 | 15,444 | ..... |
| Whitley | 349,282 | 455,303 | 428,980 | 241,891 | ..... | 187,089 |
| Small mines | 153,999 | 150,000 | 150,000 | 150,000 | ..... | ..... |
| Total | 3,111,192 | 3,357,770 | 3,333,478 | 3,602,097 | [a]268,619 | ..... |

[a] Net increase.

The following tables exhibit the average price per ton received for coal at the mines in counties producing 10,000 tons or over, the number of employees, and the average number of days worked. It will be noticed that the average for the State shows a drop from 93 cents in 1891 to 78 cents in 1896.

*Average prices for Kentucky coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Bell | $1.40 | ..... | $1.25 | $1.50 | $0.87 | $1.27 | $1.47 | $1.45 | $1.42 |
| Boyd | 1.10 | $0.84 | .81 | .74 | .82 | .80 | .84 | .80 | .72 |
| Butler | 1.24 | ..... | 1.00 | 2.00 | 1.25 | 1.25 | 1.12 | .94 | .87 |
| Carter | 1.14 | 1.10 | 1.04 | 1.29 | 1.24 | 1.37 | 1.14 | .85 | .92 |
| Christian | 1.26 | .86 | 1.16 | .95 | .97 | 1.25 | 1.18 | 1.25 | 1.23 |
| Daviess | ..... | ..... | ..... | ..... | ..... | ..... | .53 | ..... | ..... |
| Hancock | 1.58 | ..... | 1.84 | 2.50 | 2.50 | 1.00 | .90 | 1.54 | 1.51 |
| Henderson | 1.26 | .89 | .92 | .86 | .85 | .88 | .89 | .77 | .88 |
| Hopkins | .78 | .76 | .73 | .70 | .66 | .75 | .69 | .67 | .65 |
| Johnson | 1.67 | 2.13 | 2.28 | 2.37 | 2.64 | 2.40 | 2.43 | ..... | ..... |
| Knox | .84 | .77 | 1.00 | .79 | .85 | .80 | .79 | .67 | .74 |
| Laurel | .90 | .95 | 1.00 | .94 | .89 | .80 | .90 | .81 | .82 |
| Lawrence | 1.34 | 1.25 | 1.00 | 1.15 | 1.38 | .98 | .60 | .78 | .73 |
| Lee | ..... | ..... | ..... | ..... | ..... | 1.17 | 1.04 | ..... | 1.04 |
| McLean | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .71 |
| Muhlenberg | .87 | .80 | .84 | .89 | .75 | .76 | .74 | .70 | .68 |
| Ohio | .81 | .78 | .79 | .83 | .78 | .70 | .70 | .61 | .65 |
| Pulaski | 1.30 | 1.00 | 1.39 | 1.20 | 1.06 | 1.00 | .97 | .99 | 1.00 |
| Union | 1.13 | 1.08 | 1.26 | 1.01 | .95 | .87 | .88 | .83 | .71 |
| Webster | .80 | .78 | .88 | .86 | .74 | .66 | .76 | .73 | .71 |
| Whitley | 1.10 | 1.09 | 1.19 | 1.05 | 1.03 | 1.01 | 1.02 | .93 | .92 |
| The State | .99 | .92 | .93 | .92 | .86 | .86 | .86 | .78 | .79 |

*Statistics of labor employed and working time at Kentucky coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Bell | ..... | ..... | 75 | 130 | 30 | 136 | 194 | 177 |
| Boyd | ..... | ..... | 300 | 287 | 300 | 285 | 275 | 225 |
| Butler | ..... | ..... | 45 | 200 | 65 | 192 | 45 | 224 |
| Carter | 459 | 237 | 437 | 227½ | 375 | 276 | 476 | 222 |
| Christian | ..... | ..... | 125 | 187 | 135 | 210 | 143 | 182 |
| Daviess | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Hancock | ..... | ..... | 100 | 80 | 100 | 275 | 25 | 150 |
| Henderson | ..... | ..... | 231 | 249 | 150 | 231 | 194 | 185 |

*Statistics of labor employed and working time at Kentucky coal mines*—Continued.

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Hopkins | 1,104 | 231 | 1,203 | 244 | 1,292 | 228 | 1,264 | 232 |
| Johnson | 110 | 267 | 153 | 280 | 157 | 291 | 27 | 281 |
| Knox | 200 | 240 | 215 | 200 | 225 | 185 | 275 | 240 |
| Laurel | 680 | 225 | 798 | 233 | 775 | 177 | 654 | 223 |
| Lawrence | ..... | ..... | 300 | 289 | 325 | 295 | 380 | 244 |
| Lee | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Muhlenberg | 495 | 213 | 586 | 215 | 555 | 219 | 597 | 173 |
| Ohio | 520 | 236 | 625 | 225 | 818 | 169 | 590 | 170 |
| Pulaski | ..... | ..... | 74 | 170 | 45 | 135 | 108 | 180 |
| Union | 131 | 189 | 289 | 161 | 313 | 191 | 332 | 181 |
| Webster | ..... | ..... | 67 | 226 | 64 | 194 | 52 | 215 |
| Whitley | 625 | 204 | 680 | 190 | 890 | 216 | 850 | 163 |
| The State.. | 5,259 | 219 | 6,355 | 225 | 6,724 | 217 | 6,581 | 202 |

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Bell | 192 | 208 | 275 | 137 | 331 | 175 | 269 | 255 |
| Boyd | 287 | 183 | 306 | 253 | 232 | 249 | 325 | 264 |
| Butler | 64 | 195 | 82 | 155 | 86 | 199 | 85 | 143 |
| Carter | 516 | 110 | 328 | 162 | 360 | 221 | 406 | 221 |
| Christian | 88 | 194 | 77 | 142 | 75 | 94 | 56 | 95 |
| Daviess | ..... | ..... | 29 | 126 | ..... | ..... | ..... | ..... |
| Hancock | 111 | 129 | 82 | 106 | 99 | 178 | 97 | 161 |
| Henderson | 215 | 164 | 277 | 155 | 265 | 132 | 215 | 214 |
| Hopkins | 1,535 | 182 | 1,366 | 170 | 1,292 | 191 | 1,414 | 208 |
| Johnson | 98 | 284 | 50 | 242 | ..... | ..... | ..... | ..... |
| Knox | 255 | 113 | 388 | 159 | 436 | 247 | 382 | 169 |
| Laurel | 927 | 108 | 1,000 | 100 | 826 | 142 | 879 | 195 |
| Lawrence | 226 | 194 | 99 | 213 | 115 | 130 | 125 | 156 |
| Lee | 152 | 246 | 141 | 158 | ..... | ..... | 61 | 192 |
| Muhlenberg | 642 | 105 | 583 | 114 | 569 | 129 | 632 | 171 |
| Ohio | 673 | 147 | 724 | 160 | 721 | 163 | 745 | 192 |
| Pulaski | 339 | 90 | 317 | 138 | 270 | 118 | 292 | 105 |
| Union | 260 | 168 | 224 | 169 | 245 | 166 | 344 | 158 |
| Webster | 89 | 98 | 81 | 166 | 108 | 140 | 129 | 171 |
| Whitley | 1,287 | 125 | 1,218 | 158 | 1,196 | 145 | 1,298 | 104 |
| The State.. | 8,083 | 145 | 7,799 | 153 | 7,549 | 165 | 7,983 | 178 |

## MARYLAND.

Total product in 1897, 4,442,128 short tons; spot value, $3,363,996.

Maryland was one of the States that was benefited by the miners' strike of 1897, so far as tonnage is concerned, but the benefit did not extend so far as to cause an improvement in the price, which, instead of advancing, fell off from 80 cents in 1896 to 76 cents in 1897. The tonnage won in 1897 was the maximum output of the State, being 298,192 short tons, or about 7 per cent in excess of the previous year, which was the largest up to that time. Maryland's production reached a total of 4,000,000 short tons for the first time in 1896, and amounted to nearly 4,500,000 short tons in 1897. The industry suffered from no labor disturbances in 1897, the managers of the strike being unable to induce the Maryland operatives to quit work. The miners in Maryland have not been called upon to compete with machines in winning their coal, except so far as machine-mined coal in other States competes with the pick-mined coal of this State. This competition, indirect as it is to the miners, is felt in a direct and very perceptible manner by the operators, who, in order to market their product have been obliged to lower the price until in ten years there has been a decline of 20 per cent—from 95 cents in 1887 to 76 cents in 1897.

The records of the shipments of coal from the Maryland field and that of the Piedmont region in West Virginia (all embraced in the "Cumberland coal field"), have been carefully preserved since 1842, a period of fifty-six years. Reports of the Cumberland coal trade are published annually, and are shown on a subsequent page. It appears from the report for 1897 that the shipments from the region since 1842 have aggregated 98,060,562 long tons, or 109,827,829 short tons, of which 84,938,217 long tons, or 95,130,803 short tons, has come from the Frostburg or Maryland portion of the field. The local trade and colliery consumption are unimportant factors in this field, aggregating about 2 per cent of the shipments. Adding for this factor, say, 2,000,000 tons, the total yield of the Maryland field to date is found to have been approximately 97,000,000 short tons.

Coal mining in Maryland is confined to two counties, Allegany and Garrett, the former being by far the more important. Of the product in 1897 Garrett County produced 79,924 short tons, or not quite 2 per cent of the total, as against 88,681 tons, or a little more than 2 per cent of the total in 1896.

The following table shows the statistics of production in Maryland since 1889. The figures are reduced to short tons for the sake of uniformity throughout the report.

*Coal product of Maryland since 1889.*

| Year. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| 1889 | 2,885,336 | 44,217 | 10,162 | 2,939,715 | $2,517,474 | $0.86 | ..... | 3,702 |
| 1890 | 3,296,393 | 52,621 | 8,799 | 3,357,813 | 2,899,572 | .86 | 244 | 3,842 |
| 1891 | 3,771,584 | 36,959 | 11,696 | 3,820,239 | 3,082,515 | .80 | 244 | 3,891 |
| 1892 | 3,385,384 | 30,955 | 3,623 | 3,419,962 | 3,063,580 | .89 | 225 | 3,886 |
| 1893 | 3,676,137 | 26,833 | 13,071 | 3,716,041 | 3,267,317 | .88 | 240 | 3,935 |
| 1894 | 3,435,600 | 51,750 | 14,078 | 3,501,428 | 2,687,270 | .77 | 215 | 3,974 |
| 1895 | 3,840,991 | 59,950 | 14,644 | 3,915,585 | 3,160,592 | .81 | 248 | 3,912 |
| 1896 | 4,068,558 | 53,046 | 22,332 | 4,143,936 | 3,299,928 | .80 | 204 | 4,039 |
| 1897 | 4,391,703 | 27,762 | 22,663 | 4,442,128 | 3,363,996 | .76 | 262 | 4,719 |

The following table shows the annual output of coal in Maryland since 1883:

*Product of coal in Maryland from 1883 to 1897.*

| Year. | Short tons. | Value. | Average price per ton. | Average number of days active. | Average number of men employed. |
|---|---|---|---|---|---|
| 1883 | 2,476,075 | ..... | ..... | ..... | ..... |
| 1884 | 2,765,617 | ..... | ..... | ..... | ..... |
| 1885 | 2,833,337 | ..... | ..... | ..... | ..... |
| 1886 | 2,517,577 | $2,391,698 | $0.95 | ..... | ..... |
| 1887 | 3,278,023 | 3,114,122 | .95 | ..... | ..... |
| 1888 | 3,479,470 | 3,293,070 | .95 | ..... | ..... |
| 1889 | 2,939,715 | 2,517,474 | .86 | ..... | 3,702 |
| 1890 | 3,357,813 | 2,899,572 | .86 | 244 | 2,842 |
| 1891 | 3,820,239 | 3,082,515 | .80 | 244 | 3,891 |
| 1892 | 3,419,962 | 3,063,580 | .89 | 225 | 3,886 |
| 1893 | 3,716,041 | 3,267,317 | .88 | 240 | 3,935 |
| 1894 | 3,501,428 | 2,687,270 | .77 | 215 | 3,974 |
| 1895 | 3,915,585 | 3,160,592 | .81 | 248 | 3,912 |
| 1896 | 4,143,936 | 3,299,928 | .80 | 204 | 4,039 |
| 1897 | 4,442,128 | 3,363,996 | .76 | 262 | 4,719 |

The following tables, showing the shipments from the various mines in Maryland since 1883 and the total shipments from the Cumberland field (including the West Virginia mines in the field) since 1842, are obtained from the official reports of the Cumberland coal trade. The Maryland mining laws compel the use of the long ton as a basis of measurement, and the quantities in these tables are so expressed.

*Shipments of coal from Maryland mines from 1883 to 1897.*

[Long tons.]

| Company. | 1883. | 1884. | 1885. | 1886. |
|---|---|---|---|---|
| Consolidation Coal Co | 456,238 | 689,212 | 710,064 | 675,652 |
| New Central Coal Co | 210,850 | 210,140 | 203,814 | 149,561 |
| Georges Creek Coal and Iron Co. | 257,490 | 266,042 | 257,343 | 265,942 |
| Maryland Union Coal Co | 137,105 | 117,180 | 98,095 | 116,771 |
| Borden Mining Co | 151,665 | 162,057 | 179,537 | 137,747 |
| Maryland Coal Co | 235,854 | 295,736 | 365,319 | 288,742 |
| American Coal Co | 190,055 | 194,330 | 220,339 | 211,305 |
| Potomac Coal Co | 139,723 | 169,463 | 196,280 | 156,757 |
| Hampshire and Baltimore Coal Co | 194,534 | 36,416 | ..... | ..... |
| Atlantic and Georges Creek Coal Co. (Pekin mine) | 69,000 | 75,467 | 64,938 | 7,321 |
| Swanton Mining Co | 34,905 | 28,620 | 52,862 | 42,688 |
| Blæn Avon Coal Co | 84,721 | 100,961 | 69,192 | 65,830 |
| Piedmont Coal and Iron Co | 4,619 | 1,250 | 32 | 1,678 |
| Union Mining Co | 5,024 | 5,310 | 5,641 | 6,824 |
| National Coal Co | 38,998 | 42,680 | 48,307 | 62,637 |
| Davis and Elkins mine | ..... | 74,437 | 58,002 | 58,382 |
| James Ryan | ..... | ..... | ..... | ..... |
| George M. Hansel | ..... | ..... | ..... | ..... |
| Total | 2,210,781 | 2,469,301 | 2,529,765 | 2,247,837 |

| Company. | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|
| Consolidation Coal Co | 936,799 | 1,023,349 | 871,463 | 956,031 |
| New Central Coal Co | 181,906 | 169,484 | 118,885 | 218,169 |
| Georges Creek Coal and Iron Co. | 394,012 | 437,992 | 311,258 | 351,310 |
| Maryland Union Coal Co | 148,523 | 106,620 | ..... | ..... |
| Borden Mining Co | 192,636 | 212,520 | 206,549 | 290,055 |
| Maryland Coal Co | 316,518 | 340,866 | 268,438 | 366,839 |
| American Coal Co | 259,632 | 287,058 | 297,537 | 386,731 |
| Potomac Coal Co | 209,793 | 208,777 | 205,212 | 217,232 |
| Atlantic and Georges Creek Coal Co. (Pekin mine) | ..... | 6,375 | 3,884 | 752 |
| Swanton Mining Co | 61,610 | 58,383 | 40,748 | 41,401 |
| Blæn Avon Coal Co | 11,934 | ..... | ..... | ..... |
| Union Mining Co | 7,500 | 6,396 | 3,734 | 17,933 |
| National Coal Co | 117,775 | 76,592 | 72,571 | 60,206 |
| Davis and Elkins mine | 82,667 | 98,443 | 18,089 | ..... |
| James Ryan | 3,608 | ..... | ..... | ..... |
| George M. Hansel | 1,989 | 3,559 | 113 | ..... |
| Barton and Georges Creek Valley Co | ..... | 69,857 | 123,429 | 175,838 |
| Enterprise mine | ..... | 399 | 288 | 11 |
| Franklin Consolidated Coal Co | ..... | ..... | 71,837 | 66,644 |
| Big Vein Coal Co | ..... | ..... | 21,310 | 52,917 |
| Piedmont-Cumberland Coal Co | ..... | ..... | 2,493 | 29,003 |
| Anthony Mining Co | ..... | ..... | ..... | 115 |
| Total | 2,926,902 | 3,106,670 | 2,637,838 | 3,231,187 |

*Shipments of coal from Maryland mines from 1883 to 1897*—Continued.

[Long tons.]

| Company. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| Consolidation Coal Co | 910,977 | 912,787 | 907,559 | 892,502 |
| New Central Coal Co | 206,813 | 201,428 | 223,504 | 151,002 |
| Georges Creek Coal and Iron Co. | 356,927 | 297,632 | 345,791 | 364,668 |
| Borden Mining Co | 300,268 | 253,629 | 367,725 | 265,548 |
| Maryland Coal Co | 406,464 | 280,946 | 356,820 | 351,542 |
| American Coal Co | 449,631 | 384,681 | 443,963 | 453,680 |
| Potomac Coal Co | 184,706 | 137,738 | 121,258 | 108,977 |
| Swanton Mining Co | 33,029 | 5,162 | ..... | 2,465 |
| Union Mining Co | 179,232 | 176,996 | 205,210 | 173,548 |
| Barton and Georges Creek Valley Co | 201,124 | 201,365 | 193,545 | 165,886 |
| Franklin Consolidated Coal Co. *a* | 76,593 | 72,117 | 57,598 | 64,766 |
| Big Vein Coal Co | 62,832 | 66,683 | 63,940 | 47,023 |
| Piedmont-Cumberland Coal Co | 42,439 | 14,564 | 17,869 | 6,483 |
| Anthony Mining Co | 9,725 | 10,665 | 11,228 | 17,617 |
| Total | 3,420,760 | 3,016,393 | 3,316,010 | 3,065,707 |

| Company. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| Consolidation Coal Co | 923,655 | 1,151,816 | 1,265,682 | 113,866 | ..... |
| New Central Coal Co | 201,726 | 188,453 | 206,262 | 17,809 | ..... |
| Georges Creek Coal and Iron Co | 458,245 | 525,131 | 493,388 | ..... | 31,743 |
| Borden Mining Co | 244,878 | 167,712 | 168,543 | 831 | ..... |
| Maryland Coal Co | 449,234 | 359,625 | 371,234 | 11,609 | ..... |
| American Coal Co | 524,079 | 461,215 | 475,965 | 14,750 | ..... |
| Potomac Coal Co | 123,708 | 69,416 | (*b*) | ..... | ..... |
| Swanton Mining Co | ..... | 4,605 | 27,153 | 22,548 | ..... |
| Union Mining Co. (*b*) | 184,916 | 276,466 | 724,717 | 145,989 | ..... |
| Barton and Georges Creek Valley Co | 190,826 | 232,846 | (*b*) | ..... | ..... |
| Davis Coal and Coke Co | 50,781 | 108,656 | 102,885 | ..... | 5,771 |
| Big Vein Coal Co | 36,397 | 70,305 | 61,804 | ..... | 8,501 |
| Piedmont-Cumberland Coal Co | 9,537 | 8,268 | 26,950 | 18,682 | ..... |
| Anthony Mining Co | 10,062 | ..... | ..... | ..... | ..... |
| Atlantic and Georges Creek Coal Co | 4,714 | 37,750 | 7,346 | ..... | 30,404 |
| Midland Mining Co | 240 | ..... | ..... | ..... | ..... |
| Total | 3,412,998 | 3,662,264 | 3,951,929 | *c*269,665 | ..... |

*a* Succeeded by Davis Coal and Coke Co. in 1894.
*b* Succeeded by Black, Sheridan, Wilson Co. in 1897. *c* Net increase.

*Total shipments from the Cumberland coal field in*

| Year. | Frostburg region. | | | | | | |
|---|---|---|---|---|---|---|---|
| | Cumberland and Pennsylvania R. R. | | | | Cumberland Coal and Iron Company's railroad. | | |
| | By Baltimore and Ohio R. R. | By Chesapeake and Ohio Canal. | By Pennsylvania R. R. | Total. | By Baltimore and Ohio R. R. | By Chesapeake and Ohio Canal. | Total. |
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| 1842 | 757 | | | 757 | 951 | | 951 |
| 1843 | 3,661 | | | 3,661 | 6,421 | | 6,421 |
| 1844 | 5,156 | | | 5,156 | 9,734 | | 9,734 |
| 1845 | 13,738 | | | 13,738 | 10,915 | | 10,915 |
| 1846 | 11,240 | | | 11,240 | 18,555 | | 18,555 |
| 1847 | 20,615 | | | 20,615 | 32,325 | | 32,325 |
| 1848 | 36,571 | | | 36,571 | 43,000 | | 43,000 |
| 1849 | 63,676 | | | 63,676 | 78,773 | | 78,773 |
| 1850 | 73,783 | 3,167 | | 76,950 | 119,023 | 875 | 119,898 |
| 1851 | 70,893 | 51,438 | | 122,331 | 103,808 | 31,540 | 135,348 |
| 1852 | 128,534 | 46,357 | | 174,891 | 139,925 | 19,362 | 159,287 |
| 1853 | 150,381 | 84,060 | | 234,441 | 155,278 | 70,535 | 225,813 |
| 1854 | 148,953 | 63,731 | | 212,684 | 173,580 | 92,114 | 265,694 |
| 1855 | 93,691 | 77,095 | | 170,786 | 97,710 | 100,691 | 198,401 |
| 1856 | 86,994 | 80,387 | | 167,381 | 121,945 | 105,149 | 227,094 |
| 1857 | 80,743 | 55,174 | | 135,917 | 88,573 | 54,000 | 142,573 |
| 1858 | 48,018 | 166,712 | | 214,730 | 66,009 | 87,539 | 153,548 |
| 1859 | 48,415 | 211,639 | | 260,054 | 72,423 | 86,203 | 158,626 |
| 1860 | 70,669 | 232,278 | | 302,947 | 80,500 | 63,600 | 144,100 |
| 1861 | 23,878 | 68,303 | | 92,181 | 25,983 | 29,296 | 55,279 |
| 1862 | 71,745 | 75,206 | | 146,951 | 41,096 | 23,478 | 64,574 |
| 1863 | 117,796 | 173,269 | | 291,065 | 111,087 | 43,523 | 154,610 |
| 1864 | 287,126 | 194,120 | | 481,246 | 67,676 | 64,522 | 132,198 |
| 1865 | 384,297 | 285,295 | | 669,592 | 104,651 | 57,907 | 162,558 |
| 1866 | 592,938 | 291,019 | | 883,957 | 52,251 | 52,159 | 104,410 |
| 1867 | 623,031 | 385,249 | | 1,008,280 | 40,106 | 72,904 | 113,010 |
| 1868 | 659,115 | 424,406 | | 1,083,521 | 100,345 | 57,919 | 158,264 |
| 1869 | 1,016,777 | 573,243 | | 1,590,020 | 130,017 | 78,908 | 208,925 |
| | | | | | 2,092,660 | 1,192,224 | 3,284,884 |
| | | | | | *Eckhart Branch R. R.* | | |
| 1870 | 909,511 | 520,196 | | 1,429,707 | 114,404 | 83,941 | 198,345 |
| 1871 | 1,247,279 | 656,085 | | 1,903,364 | 69,864 | 194,254 | 264,118 |
| 1872 | 1,283,956 | 612,537 | 22,021 | 1,918,514 | 26,586 | 203,666 | 230,252 |
| 1873 | 1,509,570 | 641,220 | 114,589 | 2,265,379 | 89,765 | 137,582 | 227,347 |
| 1874 | 1,295,804 | 631,882 | 67,671 | 1,995,357 | 113,670 | 135,182 | 248,852 |
| 1875 | 1,095,880 | 715,673 | 160,213 | 1,971,766 | 52,505 | 164,165 | 216,670 |
| 1876 | 939,262 | 443,435 | 131,866 | 1,514,563 | 15,285 | 189,005 | 204,290 |
| 1877 | 755,278 | 473,646 | 170,884 | 1,399,808 | 63,181 | 111,350 | 174,531 |
| 1878 | 823,801 | 486,038 | 145,864 | 1,455,703 | 99,455 | 123,166 | 222,621 |
| 1879 | 933,240 | 397,009 | 154,264 | 1,484,513 | 141,907 | 104,238 | 246,145 |
| 1880 | 1,055,491 | 471,800 | 213,446 | 1,740,737 | 197,525 | 131,325 | 328,850 |
| 1881 | 1,113,263 | 270,156 | 153,501 | 1,536,920 | 271,570 | 151,526 | 423,096 |
| 1882 | 576,701 | 115,344 | 91,574 | 783,619 | 199,183 | 76,140 | 275,323 |
| 1883 | 851,985 | 302,678 | 217,065 | 1,371,728 | 197,235 | 141,390 | 338,625 |
| 1884 | 1,193,780 | 150,471 | 199,138 | 1,543,389 | 289,884 | 124,718 | 414,602 |
| 1885 | 1,091,904 | 171,460 | 206,227 | 1,469,591 | 289,407 | 117,829 | 407,236 |
| 1886 | 1,131,949 | 115,531 | 141,520 | 1,389,000 | 243,321 | 113,791 | 357,112 |
| 1887 | 1,584,114 | 132,177 | 176,241 | 1,892,532 | 332,798 | 125,305 | 458,103 |
| 1888 | 1,660,406 | 155,216 | 193,046 | 2,008,668 | 374,888 | 95,191 | 470,079 |
| 1889 | 1,436,381 | 26,886 | 177,152 | 1,634,419 | 368,497 | 26,407 | 394,904 |
| 1890 | 1,511,418 | | 291,704 | 1,803,122 | 522,334 | | 522,334 |
| 1891 | 1,628,574 | 9,070 | 289,232 | 1,926,876 | 463,142 | 39,294 | 502,436 |
| 1892 | 1,426,994 | 93,705 | 214,011 | 1,734,710 | 349,207 | 170,116 | 519,323 |
| 1893 | 1,332,634 | 135,409 | 360,807 | 1,828,850 | 341,321 | 201,947 | 543,268 |
| 1894 | 1,068,739 | 95,523 | 372,205 | 1,536,467 | 436,216 | 208,914 | 645,130 |
| 1895 | 1,193,834 | 101,076 | 255,133 | 1,550,043 | 464,407 | 212,534 | 676,941 |
| 1896 | 1,344,402 | 169,195 | 163,471 | 1,677,068 | 610,418 | 195,279 | 805,697 |
| 1897 | 1,790,813 | 96,536 | 169,679 | 2,057,028 | 586,592 | 166,691 | 753,283 |
| Total | 38,714,154 | 11,732,102 | 4,852,524 | 55,298,780 | 7,324,567 | 3,744,846 | 11,069,513 |

a Includes 118,050 tons used on line of Cumberland and Pennsylvania Railroad and its branches partly in locomotives, rolling mills, etc.

*Maryland and West Virginia from 1842 to 1897.*

| Frostburg region. | | | | Piedmont region. | | Total. | | | |
|---|---|---|---|---|---|---|---|---|---|
| Georges Creek and Cumberland R. R. | | | | Georges Creek R. R. | Hampshire R. R. by Baltimore and Ohio R. R. | Baltimore and Ohio R. R. and local. | Chesapeake and Ohio Canal. | Pennsylvania R. R. | Aggregate. |
| By Chesapeake and Ohio Canal. | By Pennsylvania R. R. | Local and Baltimore and Ohio. | Total. | | | | | | |
| *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| ..... | ..... | ..... | ..... | ..... | ..... | 1,708 | ..... | ..... | 1,708 |
| ..... | ..... | ..... | ..... | ..... | ..... | 10,082 | ..... | ..... | 10,082 |
| ..... | ..... | ..... | ..... | ..... | ..... | 14,890 | ..... | ..... | 14,890 |
| ..... | ..... | ..... | ..... | ..... | ..... | 24,653 | ..... | ..... | 24,653 |
| ..... | ..... | ..... | ..... | ..... | ..... | 29,795 | ..... | ..... | 29,795 |
| ..... | ..... | ..... | ..... | ..... | ..... | 52,940 | ..... | ..... | 52,940 |
| ..... | ..... | ..... | ..... | ..... | ..... | 79,571 | ..... | ..... | 79,571 |
| ..... | ..... | ..... | ..... | ..... | ..... | 142,449 | ..... | ..... | 142,449 |
| ..... | ..... | ..... | ..... | ..... | ..... | 192,806 | 4,042 | ..... | 196,848 |
| ..... | ..... | ..... | ..... | ..... | ..... | 174,701 | 82,978 | ..... | 256,679 |
| ..... | ..... | ..... | ..... | ..... | ..... | 268,459 | 65,719 | ..... | 334,178 |
| ..... | ..... | ..... | ..... | 73,725 | ..... | 376,219 | 157,760 | ..... | 533,979 |
| ..... | ..... | ..... | ..... | 181,303 | ..... | 503,836 | 155,845 | ..... | 659,681 |
| ..... | ..... | ..... | ..... | 227,245 | 65,570 | 478,486 | 183,786 | ..... | 662,272 |
| ..... | ..... | ..... | ..... | 269,210 | 42,765 | 502,330 | 204,120 | ..... | 706,450 |
| ..... | ..... | ..... | ..... | 252,368 | 51,628 | 465,912 | 116,574 | ..... | 582,486 |
| ..... | ..... | ..... | ..... | 218,318 | 63,060 | 395,405 | 254,251 | ..... | 649,656 |
| ..... | ..... | ..... | ..... | 257,740 | 47,934 | 426,512 | 297,842 | ..... | 724,354 |
| ..... | ..... | ..... | ..... | 289,298 | 52,564 | 493,031 | 295,878 | ..... | 788,909 |
| ..... | ..... | ..... | ..... | 85,554 | 36,660 | 172,075 | 97,599 | ..... | 269,674 |
| ..... | ..... | ..... | ..... | 69,482 | 36,627 | 218,950 | 98,684 | ..... | 317,634 |
| ..... | ..... | ..... | ..... | 266,430 | 36,240 | 531,553 | 216,792 | ..... | 748,345 |
| ..... | ..... | ..... | ..... | ..... | 44,552 | 399,354 | 258,642 | ..... | 657,996 |
| ..... | ..... | ..... | ..... | ..... | 71,345 | 560,293 | 343,202 | ..... | 903,495 |
| ..... | ..... | ..... | ..... | ..... | 90,964 | 736,153 | 343,178 | ..... | 1,079,331 |
| ..... | ..... | ..... | ..... | ..... | 72,532 | 735,669 | 458,153 | ..... | 1,193,822 |
| ..... | ..... | ..... | ..... | ..... | 88,658 | 848,118 | 482,325 | ..... | 1,330,443 |
| ..... | ..... | ..... | ..... | ..... | 83,724 | 1,230,518 | 652,151 | ..... | 1,882,669 |
| | | | | 2,190,673 | | | | | |
| | | | | *Empire and West Virginia mines.* | | | | | |
| ..... | ..... | ..... | ..... | 28,035 | 60,988 | 1,112,938 | 604,137 | ..... | 1,717,075 |
| ..... | ..... | ..... | ..... | 81,218 | 96,453 | 1,494,814 | 850,339 | ..... | 2,345,153 |
| ..... | ..... | ..... | ..... | 85,441 | 121,364 | 1,517,347 | 816,103 | 22,021 | 2,355,471 |
| ..... | ..... | ..... | ..... | 77,582 | 103,793 | 1,780,710 | 778,802 | 114,589 | 2,674,101 |
| ..... | ..... | ..... | ..... | 57,492 | 109,194 | 1,576,160 | 767,004 | 67,671 | 2,410,895 |
| ..... | ..... | ..... | ..... | 63,537 | 90,800 | 1,302,237 | 879,838 | 160,698 | 2,342,773 |
| ..... | ..... | ..... | ..... | 108,723 | 7,505 | 1,070,775 | 632,440 | 131,866 | 1,835,081 |
| ..... | ..... | ..... | ..... | ..... | ..... | 818,459 | 584,996 | 170,884 | 1,574,339 |
| ..... | ..... | ..... | ..... | ..... | 998 | 924,254 | 609,204 | 145,864 | 1,679,322 |
| ..... | ..... | ..... | ..... | ..... | 51 | 1,075,198 | 501,247 | 154,264 | 1,730,709 |
| ..... | ..... | ..... | ..... | 66,573 | ..... | 1,319,589 | 603,125 | 213,446 | 2,136,160 |
| 83,136 | 125,097 | 4,947 | 313,180 | 88,722 | ..... | 1,478,502 | 504,818 | 278,598 | 2,261,918 |
| 78,298 | 93,861 | 31,436 | 203,595 | 277,929 | ..... | 1,085,249 | 269,782 | 185,435 | 1,540,466 |
| 215,767 | 202,223 | 77,829 | 495,819 | 338,001 | ..... | 1,444,766 | 680,119 | 419,288 | 2,544,173 |
| 69,765 | 156,959 | 283,336 | 510,060 | 466,928 | ..... | 2,233,928 | 344,954 | 356,097 | 2,934,979 |
| 79,455 | 214,518 | 291,685 | 585,658 | 403,489 | ..... | 2,076,485 | 368,744 | 420,745 | 2,865,974 |
| 53,480 | 98,371 | 348,196 | 500,047 | 346,308 | ..... | 2,069,774 | 282,802 | 239,891 | 2,592,467 |
| 4,863 | 153,230 | 418,057 | 576,150 | 449,011 | ..... | 2,724,347 | 262,345 | 389,104 | 3,375,796 |
| 112 | 286,787 | 341,024 | 627,923 | 564,397 | ..... | 2,669,216 | 286,700 | 715,151 | 3,671,067 |
| ..... | 365,029 | 243,487 | 608,516 | 576,047 | ..... | 2,357,585 | 57,459 | 798,842 | 3,213,886 |
| ..... | 677,593 | 228,138 | 905,731 | 774,904 | ..... | 2,723,341 | ..... | 1,282,748 | 4,006,091 |
| ..... | 763,845 | 229,266 | 993,111 | 959,673 | ..... | 2,855,225 | 51,121 | 1,474,087 | 4,380,433 |
| ..... | 568,003 | 236,314 | 804,317 | 971,214 | ..... | 2,557,177 | 266,901 | 1,205,486 | 4,029,564 |
| ..... | 741,954 | 201,938 | 943,892 | 1,031,797 | ..... | 2,423,159 | 338,107 | 1,586,541 | 4,347,807 |
| ..... | 773,074 | 111,036 | 884,110 | 900,399 | ..... | 2,084,265 | 304,437 | 1,577,404 | 3,966,106 |
| 125 | 1,031,015 | 110,258 | 1,141,398 | 1,157,803 | ..... | 2,418,554 | 314,551 | 1,793,080 | 4,526,185 |
| ..... | 995,443 | 75,400 | 1,070,843 | 1,307,822 | ..... | 2,807,161 | 364,474 | 1,689,795 | 4,861,430 |
| ..... | 918,712 | 111,135 | 1,029,847 | 1,463,331 | ..... | a3,615,142 | 263,227 | 1,426,120 | 5,303,489 |
| 585,001 | 8,165,714 | 3,343,482 | 12,094,197 | 12,646,376 | 1,475,969 | 63,684,490 | 17,357,357 | 17,019,715 | 98,060,562 |

and at Cumberland and Piedmont; also 368,097 tons used by the Baltimore and Ohio Railroad Com-

## MICHIGAN.

Total product in 1897, 223,592 short tons; spot value, $325,416.

Unusual activity was displayed in developing the coal resources of Michigan, in 1897, and the result is exhibited in an increase in output over 1896 of 130,710 short tons, or about 140 per cent. Compared with 1895 the product in 1897 shows an increase of nearly 100 per cent, and compared with 1882, which was the banner year in the history of the State, there was an increase of 65 per cent. It is probable that a good portion of the increased production in 1897 was due to the coal famine among some of the manufacturing cities, induced by the miners' strike in other States. However that may be, it has enabled Michigan operators to get their coal into the market, which is usually a harder task than to retain a hold once secured.

The production by counties in 1896 and 1897 was as follows:

*Coal product of Michigan in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bay | 2 | 6,000 | 676 | 760 | 7,436 | $13,302 | $1.79 | 100 | 42 |
| Eaton | 2 | 360 | 1,255 | 30 | 1,645 | 2,160 | 1.31 | 151 | 11 |
| Jackson | 3 | 44,023 | 200 | 1,095 | 45,318 | 81,350 | 1.80 | 199 | 120 |
| Saginaw | 2 | 3,175 | 3,840 | 300 | 7,315 | 12,728 | 1.80 | 91 | 67 |
| Huron, Shiawassee | 2 | 29,592 | 576 | 1,000 | 31,168 | 41,091 | 1.32 | 181 | 80 |
| Total | 11 | 83,150 | 6,547 | 3,185 | 92,882 | 150,631 | 1.62 | 157 | 320 |

*Coal product of Michigan in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bay | 2 | 54,733 | 396 | 1,850 | 57,029 | $87,327 | $1.53 | 227 | 124 |
| Eaton | 3 | 952 | 2,770 | 65 | 3,787 | 6,750 | 1.78 | 188 | 26 |
| Genesee, Huron | 2 | 18,761 | 3,873 | 2,125 | 24,759 | 34,475 | 1.39 | 208 | 73 |
| Jackson | 4 | 58,050 | 12,681 | 5,230 | 75,961 | 101,921 | 1.34 | 223 | 181 |
| Saginaw, Shiawassee | 2 | 56,090 | 4,966 | 1,000 | 62,056 | 94,943 | 1.53 | 258 | 133 |
| Total | 13 | 188,636 | 24,686 | 10,270 | 223,592 | 325,416 | 1.46 | 230 | 537 |

The following tables show the details of production in Michigan for the past six years and the total output since 1877:

*Coal product of Michigan for six years.*

| Year. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| 1892 | 27,200 | 45,180 | 5,610 | 77,990 | $121,314 | $1.56 | 230 | 195 |
| 1893 | 27,787 | 16,367 | 1,825 | 45,979 | 82,462 | 1.79 | 154 | 162 |
| 1894 | 60,817 | 7,055 | 2,150 | 70,022 | 103,049 | 1.47 | 224 | 223 |
| 1895 | 80,403 | 27,019 | 4,900 | 112,322 | 180,016 | 1.60 | 186 | 320 |
| 1896 | 83,150 | 6,547 | 3,185 | 92,882 | 150,631 | 1.62 | 157 | 320 |
| 1897 | 188,636 | 24,686 | 10,270 | 223,592 | 325,416 | 1.46 | 230 | 537 |

*Coal product of Michigan from 1877 to 1897.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| Previous to 1877 | 350,000 | 1887 | 71,461 |
| 1877 | 69,197 | 1888 | 81,407 |
| 1878 | 85,322 | 1889 | 67,431 |
| 1879 | 82,015 | 1890 | 74,977 |
| 1880 | 129,053 | 1891 | 80,307 |
| 1881 | 130,130 | 1892 | 77,990 |
| 1882 | 135,339 | 1893 | 45,979 |
| 1883 | 71,296 | 1894 | 70,022 |
| 1884 | 36,712 | 1895 | 112,322 |
| 1885 | 45,178 | 1896 | 92,882 |
| 1886 | 60,434 | 1897 | 223,592 |

## MISSOURI.

Total product in 1897, 2,665,626 short tons; spot value, $2,887,884.

Although the coal product of Missouri in 1897 was 334,084 short tons, or 14 per cent, larger than the output of 1896, it did not reach the amounts won in 1884, 1885, 1887, 1888, 1890, 1891, 1892, or 1893. The maximum product was obtained in 1888, which, as stated in connection with the statistics of production in Iowa, was a year of exceptional activity in coal mining throughout the West.

The Missouri coal fields are surrounded by formidable rivals, the most important of which are the more favorably situated and more extensively developed fields of Illinois on the east, from which the fuel supply of St. Louis and other cities in the eastern part of the State is

principally drawn. Iowa on the north, Kansas on the west, the Indian Territory on the southwest, and Arkansas on the south complete a barrier around the State through which the coal of local production is unable to break. Any substantial increase in the coal product of Missouri may therefore be taken as indicative of industrial development of a comparatively local nature, and variations in the production of the State as reflecting the conditions of local industries, except when strikes in other fields cause a temporary demand upon the Missouri mines.

What strikes there were in Missouri during 1897 were comparatively unimportant and were not connected with the general strike which paralyzed the industry in the Eastern States, and they had no appreciable effect upon the production in the State. At the Vandalia mine, in Audrain County, 60 men were out for ten days in August; at the Brush Creek mine, in Jackson County, 75 men were idle sixty-five days, beginning August 26; at the three mines of the Lexington Coal Mining Company, in Lafayette County, 225 men were idle the first two days of September; at the Wellington mine, in the same county, 8 men were on strike for five days in August; at No. 48 mine of the Kansas and Texas Coal Company, 83 men were out for fifty-seven days, beginning July 31; at the Blackbird mine, in Putnam County, 20 men were out during July; at the Mendota mine, in the same county, 300 men were on strike for twelve days in August; at the Emporia mine, same county, 42 men were out nineteen days from August 2; and at Jones & Davis' mine, in Randolph County, 70 men were out seventeen days in July and August.

The number of mining machines in use in 1897 was 3, a decrease of 1 from 1896, but the product won by machines increased from 47,827 short tons to 59,692 short tons during the year.

*Coal product of Missouri in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Adair | 3 | 33,511 | ..... | 300 | 33,811 | $35,618 | $1.05 | 150 | 135 |
| Audrain<br>Barton | 3 | 93,673 | 5,161 | 1,538 | 100,372 | 118,582 | 1.18 | 272 | 250 |
| Bates | 9 | 324,276 | 5,087 | 6,415 | 335,778 | 297,166 | .89 | 133 | 529 |
| Boone | 3 | 4,874 | 4,274 | 32 | 9,180 | 11,650 | 1.27 | 169 | 49 |
| Callaway | 7 | 4,000 | 24,960 | 158 | 29,118 | 48,597 | 1.67 | 219 | 87 |
| Grundy | 2 | 33,007 | 5,435 | 2,066 | 40,508 | 68,882 | 1.70 | 191 | 172 |
| Henry | 8 | 42,413 | 1,404 | 459 | 44,276 | 60,721 | 1.37 | 217 | 165 |
| Lafayette | 24 | 298,605 | 22,117 | 5,076 | 325,798 | 424,797 | 1.30 | 188 | 1,108 |
| Linn | 5 | 71,856 | 9,044 | 698 | 81,598 | 118,799 | 1.46 | 217 | 229 |
| Macon | 10 | 561,710 | 2,131 | 9,715 | 573,556 | 499,283 | .87 | 182 | 1,283 |
| Montgomery | 2 | 18,000 | 1,505 | 360 | 19,865 | 22,956 | 1.16 | 214 | 49 |
| Putnam | 3 | 99,785 | 1,201 | 1,936 | 102,922 | 111,529 | 1.08 | 225 | 330 |
| Randolph | 8 | 296,421 | 12,151 | 2,527 | 311,099 | 309,164 | .99 | 212 | 737 |
| Ray | 9 | 172,200 | 6,967 | 3,073 | 182,240 | 243,141 | 1.33 | 155 | 642 |
| Vernon | 3 | 273,232 | 1,209 | 4,590 | 279,031 | 263,065 | .94 | 188 | 393 |
| Caldwell<br>Cole | 2 | 32,200 | 10,500 | 600 | 43,300 | 71,820 | 1.66 | 258 | 113 |
| Jackson<br>Morgan | 2 | 15,834 | 6,340 | 1,500 | 23,674 | 37,278 | 1.57 | 241 | 108 |
| Pettis<br>Ralls | 2 | 9,200 | 200 | 100 | 9,500 | 11,836 | 1.25 | 191 | 35 |
| Small mines | ..... | ..... | 120,000 | ..... | 120,000 | 140,000 | ..... | ..... | ..... |
| Total | 105 | 2,384,797 | 239,686 | 41,143 | 2,665,626 | 2,837,884 | 1.08 | 168 | 6,414 |

The annual production since 1873 has been as follows:

*Coal product of Missouri since 1873.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1873 | 784,000 | 1886 | 1,800,000 |
| 1874 | 789,680 | 1887 | 3,209,916 |
| 1875 | 840,000 | 1888 | 3,909,967 |
| 1876 | 1,008,000 | 1889 | 2,557,823 |
| 1877 | 1,008,000 | 1890 | 2,735,221 |
| 1878 | 1,008,000 | 1891 | 2,674,606 |
| 1879 | 1,008,000 | 1892 | 2,773,949 |
| 1880 | 1,680,000 | 1893 | 2,897,442 |
| 1881 | 1,960,000 | 1894 | 2,245,039 |
| 1882 | 2,240,000 | 1895 | 2,372,393 |
| 1883 | 2,520,000 | 1896 | 2,331,542 |
| 1884 | 2,800,000 | 1897 | 2,665,626 |
| 1885 | 3,080,000 | | |

The following table contains the statistics of production, by counties, since 1889, with the increase and decrease in 1897 as compared with 1896:

*Coal product of Missouri since 1889, by counties.*

[Short tons.]

| County. | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|
| Adair | 18,592 | 16,000 | 10,940 | 11,138 | 20,893 |
| Andrain | 26,194 | 20,261 | 8,772 | 23,012 | 37,986 |
| Barton | 61,167 | 28,500 | 85,002 | 50,561 | 42,360 |
| Bates | 755,989 | 751,702 | 628,580 | 572,730 | 409,819 |
| Boone | 31,405 | 17,000 | 16,340 | 15,636 | 11,650 |
| Caldwell | 13,594 | 21,599 | 51,065 | 30,806 | 18,102 |
| Callaway | 16,053 | 5,331 | 22,458 | 21,710 | 24,266 |
| Clay | ..... | ..... | ..... | ..... | 12,724 |
| Cooper | 996 | ..... | ..... | 1,720 | 1,632 |
| Grundy | 23,401 | 24,000 | 30,000 | 27,300 | 37,633 |
| Henry | 180,118 | 109,768 | 102,866 | 89,769 | 100,415 |
| Jasper | 720 | ..... | ..... | ..... | 604 |
| Johnson | 12,841 | 5,950 | 4,500 | 5,680 | 11,009 |
| Lafayette | 348,670 | 347,688 | 277,393 | 324,848 | 339,668 |
| Linn | 6,992 | 1,300 | 26,994 | 40,622 | 93,207 |
| Macon | 446,396 | 540,061 | 592,105 | 668,146 | 688,479 |
| Moniteau | ..... | ..... | ..... | ..... | 520 |
| Montgomery | 12,300 | 13,584 | 16,129 | 16,689 | 12,000 |
| Morgan | 2,000 | 650 | 220 | 48 | ..... |
| Putnam | 83,774 | 108,514 | 122,666 | 137,058 | 139,582 |
| Randolph | 221,463 | 269,372 | 274,520 | 149,608 | 214,490 |
| Ray | 220,530 | 278,118 | 213,539 | 235,298 | 220,418 |
| St. Clair | 6,880 | 5,050 | 2,500 | 6,500 | 336 |
| Vernon | 39,420 | 13,385 | 48,017 | 155,070 | 309,649 |
| Other counties and small mines | 28,328 | 157,388 | 140,000 | 150,000 | 150,000 |
| Total | 2,557,823 | 2,735,221 | 2,674,606 | 2,773,949 | 2,897,442 |

*Coal product of Missouri since 1889, by counties*—Continued.

[Short tons.]

| County. | 1894. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|---|
| Adair | 10,150 | 23,038 | 25,738 | 33,811 | 8,073 | ..... |
| Audrain | 14,921 | 38,386 | 21,857 | 45,972 | 24,115 | ..... |
| Barton | 139,977 | 51,400 | 13,731 | 54,400 | 40,669 | ..... |
| Bates | 279,706 | 354,741 | 452,435 | 335,778 | ..... | 116,657 |
| Boone | 18,160 | 15,180 | 14,751 | 9,180 | ..... | 5,571 |
| Caldwell | 26,304 | 16,980 | 21,800 | 40,800 | 19,000 | ..... |
| Callaway | 18,687 | 19,169 | 40,709 | 29,118 | ..... | 11,591 |
| Chariton | 100 | ..... | ..... | ..... | ..... | ..... |
| Cole | ..... | ..... | ..... | 2,500 | 2,500 | ..... |
| Cooper | 2,243 | 225 | ..... | ..... | ..... | ..... |
| Grundy | ..... | 29,340 | 34,602 | 40,508 | 5,906 | ..... |
| Henry | 158,409 | 55,428 | 35,505 | 44,276 | 8,771 | ..... |
| Jackson | 6,000 | 21,300 | 27,960 | 17,674 | ..... | 10,286 |
| Johnson | 6,498 | 250 | 200 | ..... | ..... | 200 |
| Lafayette | 203,423 | 263,927 | 258,177 | 325,798 | 67,621 | ..... |
| Linn | 77,272 | 99,035 | 64,504 | 81,598 | 17,094 | ..... |
| Livingston | ..... | 623 | 706 | ..... | ..... | 706 |
| Macon | 489,579 | 506,270 | 459,778 | 573,556 | 113,778 | ..... |
| Moniteau | 364 | 425 | 250 | ..... | ..... | 250 |
| Montgomery | 8,871 | 10,881 | 12,106 | 19,865 | 7,759 | ..... |
| Morgan | 745 | 1,720 | 200 | 6,000 | 5,800 | ..... |
| Pettis | ..... | ..... | ..... | 800 | 800 | ..... |
| Putnam | 116,655 | 68,044 | 87,740 | 102,922 | 15,182 | ..... |
| Ralls | ..... | 9,800 | 10,628 | 8,700 | ..... | 1,928 |
| Randolph | 201,387 | 228,087 | 255,713 | 311,099 | 55,386 | ..... |
| Ray | 100,686 | 133,681 | 129,356 | 182,240 | 52,884 | ..... |
| Saline | ..... | 150 | 400 | ..... | ..... | 400 |
| St. Clair | 679 | 220 | 80 | ..... | ..... | 80 |
| Vernon | 244,215 | 305,685 | 242,616 | 279,031 | 36,415 | ..... |
| Other counties and small mines | 120,000 | 120,000 | 120,000 | 120,000 | ..... | ..... |
| Total | 2,245,429 | 2,372,380 | 2,331,542 | 2,665,626 | a334,084 | ..... |

a Net increase.

*Average prices for Missouri coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Adair | $1.66 | $1.70 | $1.75 | $1.75 | $1.49 | $1.48 | $1.24 | $1.15 | $1.05 |
| Audrain | 1.47 | 1.61 | 1.57 | 1.50 | 1.40 | 1.50 | 1.45 | 1.30 | 1.27 |
| Barton | 1.35 | 1.06 | 1.22 | 1.29 | 1.12 | 1.06 | 1.09 | 1.00 | 1.13 |
| Bates | 1.14 | 1.02 | 1.04 | 1.00 | 1.01 | 1.04 | .91 | .87 | .89 |
| Boone | 1.54 | 1.50 | 1.50 | 1.53 | 1.62 | 1.55 | 1.28 | 1.29 | 1.27 |
| Caldwell | 1.97 | 1.98 | 2.15 | 2.20 | 1.98 | 1.76 | 1.39 | 1.52 | 1.65 |
| Callaway | 1.79 | 1.50 | 1.42 | 1.56 | 1.54 | 1.60 | 1.51 | 1.37 | 1.67 |
| Grundy | 2.05 | 2.05 | 2.05 | 2.05 | 2.05 | ..... | 1.95 | 1.80 | 1.70 |
| Henry | 1.55 | 1.48 | 1.33 | 1.41 | 1.45 | 1.13 | 1.45 | 1.42 | 1.37 |
| Jackson | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.60 | 1.60 |
| Lafayette | 1.60 | 1.55 | 1.55 | 1.60 | 1.52 | 1.68 | 1.40 | 1.33 | 1.30 |
| Linn | 1.88 | ..... | 1.19 | 1.56 | 1.62 | 1.59 | 1.53 | 1.52 | 1.46 |
| Macon | 1.23 | 1.11 | 1.02 | 1.04 | 1.06 | .96 | .93 | .90 | .87 |
| Montgomery | 1.42 | 1.35 | 1.35 | 1.36 | 1.35 | 1.25 | 1.25 | 1.15 | 1.16 |
| Putnam | 1.34 | 1.31 | 1.31 | 1.37 | 1.36 | 1.21 | 1.22 | 1.09 | 1.08 |
| Randolph | 1.29 | 1.14 | 1.06 | 1.07 | 1.10 | 1.09 | 1.06 | 1.09 | .99 |
| Ray | 1.57 | 1.52 | 1.62 | 1.54 | 1.51 | 1.44 | 1.44 | 1.37 | 1.33 |
| Vernon | 1.18 | 1.20 | 1.04 | 1.02 | 1.01 | .99 | .85 | .87 | .94 |
| The State | 1.36 | 1.24 | 1.23 | 1.23 | 1.23 | 1.17 | 1.12 | 1.08 | 1.08 |

*Statistics of labor employed and working time at Missouri coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Adair | 48 | 280 | 40 | 300 | 140 | 300 | 81 | 188 |
| Audrain | 70 | 205 | 33 | 180 | 60 | 224 | 101 | 184 |
| Barton | 90 | 231 | 263 | 221 | 49 | 179 | 207 | 116 |
| Bates | 1,315 | 215 | 1,077 | 235 | 663 | 207 | 771 | 162 |
| Boone | 46 | 290 | 53 | 257 | 38 | 273 | 32 | 203 |
| Caldwell | 77 | 294 | 194 | 230 | 158 | 244 | 74 | 223 |
| Callaway | 11 | 218 | 90 | 230 | 97 | 243 | 127 | 218 |
| Grundy | 50 | 200 | 90 | 297 | 140 | 275 | 130 | 300 |
| Henry | 311 | 207 | 286 | 218 | 246 | 219 | 279 | 225 |
| Lafayette | 1,056 | 217 | 850 | 206 | 949 | 233 | 1,148 | 226 |
| Linn | ..... | ..... | 90 | 240 | 135 | 249 | 290 | 233 |
| Macon | 1,027 | 259 | 1,198 | 228 | 1,489 | 252 | 1,833 | 232 |
| Montgomery | 33 | 200 | 37 | 260 | 40 | 195 | 48 | 200 |
| Putnam | 355 | 234 | 430 | 196 | 393 | 242 | 460 | 236 |
| Randolph | 635 | 229 | 535 | 249 | 371 | 227 | 523 | 191 |
| Ray | 687 | 241 | 753 | 178 | 694 | 206 | 636 | 196 |
| Vernon | 44 | 118 | 139 | 131 | 186 | 166 | 537 | 126 |
| The State | 5,971 | 229 | 6,199 | 218 | 5,893 | 230 | 7,375 | 206 |

*Statistics of labor employed and working time at Missouri coal mines*—Continued.

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Adair | 28 | 226 | 62 | 153 | 58 | 214 | 135 | 150 |
| Audrain | 59 | 186 | 72 | 238 | 60 | 220 | 105 | 246 |
| Barton | 412 | 195 | 150 | 172 | 50 | 80 | 145 | 290 |
| Bates | 919 | 83 | 683 | 168 | 662 | 189 | 529 | 133 |
| Boone | 50 | 200 | 57 | 202 | 68 | 191 | 49 | 169 |
| Caldwell | 115 | 228 | 115 | 243 | 100 | 250 | 105 | 262 |
| Callaway | 81 | 156 | 73 | 205 | 102 | 165 | 87 | 219 |
| Grundy | ..... | ..... | 105 | 222 | 140 | 250 | 172 | 191 |
| Henry | 327 | 156 | 173 | 115 | 195 | 144 | 165 | 217 |
| Jackson | ..... | ..... | ..... | ..... | 115 | 123 | 100 | 248 |
| Lafayette | 1,305 | 119 | 1,015 | 147 | 927 | 157 | 1,108 | 188 |
| Linn | 264 | 233 | 282 | 234 | 286 | 153 | 229 | 217 |
| Macon | 1,387 | 183 | 1,346 | 152 | 1,218 | 169 | 1,283 | 182 |
| Montgomery | 35 | 156 | 25 | 150 | 38 | 150 | 49 | 214 |
| Putnam | 486 | 146 | 301 | 148 | 330 | 168 | 330 | 225 |
| Randolph | 556 | 144 | 602 | 187 | 622 | 185 | 737 | 212 |
| Ray | 690 | 78 | 559 | 132 | 536 | 142 | 642 | 155 |
| Vernon | 666 | 90 | 542 | 149 | 437 | 146 | 393 | 188 |
| The State | 7,523 | 138 | 6,299 | 163 | 5,982 | 168 | 6,414 | 168 |

## MONTANA.

Total product in 1897, 1,647,882 short tons; spot value, $2,897,408.

Coal production in Montana has shown an uninterrupted increase each year since 1887, the output in 1895 showing a phenomenal gain of over 62 per cent over 1894, with an increase of 50 per cent in value. The product in 1896 was only 2 per cent more than that of 1895, and this was accompanied by a sharp decline in value. The actual loss amounted to $571,234, the price per ton declining from $1.89 to $1.47. The conditions were more satisfactory in 1897; the product increased 104,437 short tons, and the value $617,736, the average price per ton showing an advance of 29 cents to $1.76.

The development of the Montana coal fields on a commercial scale dates from 1889. Previous to that year the largest output was in 1885, when the product was 86,440 short tons. During 1893 extensive improvements were made at the Sandcoulee mines, in Cascade County. Mining machines were introduced, and the output of the county was increased over 100 per cent—from 242,120 short tons in 1892 to 516,460

short tons in 1893. The increase in this county in 1894 was more than three times the total increase in the State, the gain in Cascade County being in part offset by a decrease of over 90,000 tons, or about 30 per cent, in Park County. Cascade County showed a gain of about 75,000 tons in 1895; Park County increased its output by 288,947 short tons, or over 130 per cent, and Carbon County appeared for the first time as a coal producer, with an output of 184,143 short tons. In 1896 Cascade County increased its production by 387,421 tons, or 54 per cent; Carbon County increased its output by 51,185 tons, or 28 per cent, and Gallatin County increased a little over 10,000 tons. These were offset in part by a decrease of 410,068 tons in Park County. All of the important counties increased their production in 1897, although Carbon County, with a gain of 10,433 tons in product, showed a loss of $63,387 in value. Cascade County gained 37,292 tons in amount and $525,572 in value; Park County gained 29,757 tons and $146,197; Gallatin County gained 23,953 tons, but only $8,489 in value. There were two firms using mining machines in 1897 against three in 1896. The number of machines in use was one less in 1897 than in 1896, notwithstanding which the product by machines increased from 579,414 short tons to 720,345 short tons. There were no strikes among Montana coal miners in 1897.

The details of production in 1896 and 1897 are shown in the following tables:

*Coal product of Montana in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Cascade | 3 | 978,110 | 5,000 | 14,400 | 103,788 | 1,101,298 | $1,473,532 | $1.34 | 247 | 1,505 |
| Choteau | 8 | ..... | 4,825 | 226 | ..... | 5,051 | 18,915 | 3.74 | 82 | 44 |
| Gallatin | 3 | 106,960 | 1,500 | ..... | ..... | 108,460 | 214,535 | 1.98 | 180 | 306 |
| Meagher, Park | 5 | 250 | 13,320 | 50 | 79,632 | 93,252 | 148,235 | 1.59 | 275 | 168 |
| Carbon, Lewis and Clarke | 2 | 229,553 | 2,831 | 3,000 | ..... | 235,384 | 424,455 | 1.80 | 224 | 312 |
| Total | 21 | 1,314,873 | 27,476 | 17,676 | 183,420 | 1,543,445 | 2,279,672 | 1.47 | 234 | 2,335 |

*Coal product of Montana in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Cascade | 5 | 1,040,783 | 19,098 | 13,802 | 64,907 | 1,138,590 | $1,999,104 | $1.76 | 269 | 1,491 |
| Choteau | 4 | 2,495 | 2,350 | ..... | ..... | 4,845 | 12,340 | 2.55 | 193 | 30 |
| Gallatin | 2 | 130,913 | 1,250 | 250 | ..... | 132,413 | 223,024 | 1.68 | 286 | 181 |
| Park | 6 | 21,189 | 1,700 | ..... | 100,000 | 122,889 | 294,072 | 2.39 | 191 | 301 |
| Carbon, Dawson, Meagher | 5 | 239,478 | 5,309 | 4,358 | ..... | 249,145 | 368,868 | 1.48 | 219 | 334 |
| Total | 22 | 1,434,858 | 29,707 | 18,410 | 164,907 | 1,647,882 | 2,897,408 | 1.76 | 252 | 2,337 |

The following table shows the total output of coal in Montana since 1883 and the value of the product for the last eight years:

*Coal product of Montana since 1883.*

| Year. | Short tons. | Value. | Year. | Short tons. | Value. |
|---|---|---|---|---|---|
| 1883 | 19,795 | ..... | 1891 | 541,861 | $1,228,630 |
| 1884 | 80,376 | ..... | 1892 | 564,648 | 1,330,847 |
| 1885 | 86,440 | ..... | 1893 | 892,309 | 1,772,116 |
| 1886 | 49,846 | ..... | 1894 | 927,395 | 1,887,390 |
| 1887 | 10,202 | ..... | 1895 | 1,504,193 | 2,850,906 |
| 1888 | 41,467 | ..... | 1896 | 1,543,445 | 2,279,672 |
| 1889 | 363,301 | ..... | 1897 | 1,647,882 | 2,897,408 |
| 1890 | 517,477 | $1,252,492 | | | |

The following tables show the product and value, by counties, since 1889, the average price per ton, and the statistics of labor and working time in the important producing counties:

*Product and value of Montana coal since 1889, by counties.*

| County. | 1889. | | 1890. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Cascade | 166,480 | $339,226 | 200,435 | $406,748 |
| Choteau | 820 | 2,160 | 800 | 2,000 |
| Custer | 3,470 | 9,129 | 10,228 | 26,417 |
| Dawson | 733 | 1,900 | 450 | 1,350 |
| Fergus | 460 | 1,380 | 1,260 | 5,740 |
| Gallatin | 43,838 | 104,377 | 51,452 | 119,084 |
| Lewis and Clarke | 50 | 200 | 115 | 283 |
| Missoula | 150 | 450 | ..... | ..... |
| Park | 147,300 | 421,950 | 252,737 | 690,870 |
| Total | 363,301 | 880,773 | 517,477 | 1,252,492 |

| County. | 1891. | | 1892. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Cascade | 198,107 | $396,219 | 242,120 | $484,320 |
| Choteau | 478 | 1,723 | 1,574 | 6,338 |
| Dawson | 250 | 625 | 335 | 1,000 |
| Fergus | 250 | 1,400 | 400 | 2,100 |
| Gallatin | 56,981 | 135,893 | 61,198 | 152,496 |
| Lewis and Clarke | ..... | ..... | ..... | ..... |
| Meagher | 50 | 200 | 30 | 120 |
| Park | 285,745 | 692,570 | 258,991 | 684,473 |
| Total | 541,861 | 1,228,630 | 564,648 | 1,330,847 |

*Coal product of Montana since 1889, by counties*—Continued.

| County. | 1893. | | 1894. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Cascade | 516,460 | $907,640 | 638,960 | $1,238,001 |
| Choteau | 5,295 | 20,953 | 2,892 | 11,089 |
| Dawson | 440 | 1,320 | 545 | 1,635 |
| Fergus | 200 | 1,200 | 325 | 1,625 |
| Gallatin | 63,163 | 148,021 | 69,257 | 168,431 |
| Granite | ..... | ..... | 600 | 600 |
| Lewis and Clarke | 125 | 666 | 60 | 300 |
| Meagher | 100 | 500 | 503 | 2,315 |
| Park | 306,526 | 691,816 | 214,253 | 463,394 |
| Total | 892,309 | 1,772,116 | 927,395 | 1,887,390 |

| County. | 1895. | | 1896. | |
|---|---|---|---|---|
| | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | |
| Carbon | 184,143 | $388,924 | 235,328 | $424,205 |
| Cascade | 713,877 | 1,238,035 | 1,101,298 | 1,473,532 |
| Choteau | 3,725 | 8,050 | 5,051 | 18,915 |
| Dawson | 600 | 1,650 | ..... | ..... |
| Gallatin | 98,398 | 204,122 | 108,460 | 214,535 |
| Lewis and Clarke | 50 | 250 | 56 | 250 |
| Meagher | 200 | 800 | 120 | 360 |
| Park | 503,200 | 1,009,075 | 93,132 | 147,875 |
| Total | 1,504,193 | 2,850,906 | 1,543,445 | 2,279,672 |

| County. | 1897. | | Increase 1897. | | Decrease 1897. | |
|---|---|---|---|---|---|---|
| | Product. | Value. | Product. | Value. | Product. | Value. |
| | *Short tons.* | | *Short tons.* | | *Short tons.* | |
| Carbon | 245,761 | $360,818 | 10,433 | ..... | ..... | $63,387 |
| Cascade | 1,138,590 | 1,999,104 | 37,292 | $525,572 | ..... | ..... |
| Choteau | 4,845 | 12,340 | ..... | ..... | 206 | 6,575 |
| Dawson | 2,800 | 6,250 | 2,800 | 6,250 | ..... | ..... |
| Gallatin | 132,413 | 223,024 | 23,953 | 8,489 | ..... | ..... |
| Lewis and Clarke | ..... | ..... | ..... | ..... | 56 | 250 |
| Meagher | 584 | 1,800 | 464 | 1,440 | ..... | ..... |
| Park | 122,889 | 294,072 | 29,757 | 146,197 | ..... | ..... |
| Total | 1,647,882 | 2,897,408 | *a* 104,437 | *a* 617,736 | ..... | ..... |

*a* Net increase.

*Average prices for Montana coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Carbon | ..... | ..... | ..... | ..... | ..... | ..... | $2.11 | $1.80 | $1.47 |
| Cascade | $2.04 | $2.03 | $2.00 | $2.00 | $1.76 | $1.94 | 1.72 | 1.34 | 1.76 |
| Gallatin | 2.38 | 2.31 | 2.38 | 2.50 | 2.34 | 2.43 | 2.07 | 1.98 | 1.68 |
| Park | 2.86 | 2.73 | 2.43 | 2.64 | 2.31 | 2.16 | 2.01 | 1.58 | 2.39 |
| The State. | 2.42 | 2.42 | 2.27 | 2.36 | 1.99 | 2.04 | 1.89 | 1.47 | 1.76 |

*Statistics of labor employed and working time at Montana coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Cascade | 379 | ..... | 401 | ..... | 426 | 275 | 634 | 247 |
| Gallatin | 120 | ..... | 139 | ..... | 146 | 298 | 151 | 278 |
| Park | 705 | ..... | 562 | ..... | 565 | 241 | 568 | 240 |
| The State. | 1,251 | ..... | 1,119 | ..... | 1,158 | 258 | 1,401 | 242 |

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Carbon | ..... | ..... | 309 | 194 | 310 | 225 | 316 | 226 |
| Cascade | 1,165 | 184 | 1,341 | 235 | 1,505 | 247 | 1,491 | 269 |
| Gallatin | 153 | 265 | 235 | 245 | 306 | 180 | 181 | 286 |
| Park | 408 | 198 | 260 | 197 | 164 | 280 | 301 | 191 |
| The State. | 1,782 | 192 | 2,184 | 223 | 2,335 | 234 | 2,337 | 252 |

## NEBRASKA.

The southwestern corner of Nebraska contains a portion of the western coal field, but the veins of coal being on the edge of the field are pinched to thin seams, varying from 6 to 22 inches. Some coal has been taken out for local consumption, but with the development of the fields of Iowa, Kansas, and Missouri, more favored both as to quality and conditions for economical mining, and with the operators of these mines seeking a market for their surplus product, such little work as has been done on Nebraska coal deposits has been practically abandoned. A small amount (3,560 short tons) was mined in Dixon County in 1896, all of which was consumed locally. The product in 1897 fell off to 495 tons.

## NEVADA.

During 1894 a small amount of coal (150 short tons) was mined in Esmeralda County, Nevada, by Mr. William Groezinger, of Columbus It was sold to the Columbus Borax Works at $2.50 per ton.

Mr. Groezinger writes that a coal field of considerable extent has been discovered about 20 miles from Candelaria. He states there are twelve different veins, varying in thickness from 4 to 12 feet, of semi-bituminous coal, some of which will make coke. The outcrops are badly weathered and decomposed, but the quality improves at greater depth. At present all the silver mines in the vicinity are shut down, and there is no demand for the fuel. With a return to prosperity for the silver-mining industry attention will be given to any properties promising an adequate and cheap supply of fuel.

Coal is also reported in the vicinity of Carlin, in Elko County, and a company of Nevada citizens was organized, under the name of the Humboldt Coal Company, to exploit the deposits. No output has been obtained up to date.

## NEW MEXICO.

Total product in 1897, 716,981 short tons; spot value, $991,611.

New Mexico's coal product in 1897 was 94,355 short tons, or 15 per cent larger than in 1896, but was 3,673 short tons less than the output of 1895. There were no particular features of interest affecting the industry in the Territory in 1897. Machine mining has not yet invaded New Mexico, and there have been no labor disturbances of any moment. The mines of the Cerrillos Coal Railroad Company, in Santa Fe County, were shut down for six days early in February, 275 men being on strike, and several short strikes occurred at the Willis mine, in Rio Arriba County, where 20 men are employed, the total time lost being about thirty days.

The details of production, by counties, in 1896 and 1897 are shown in the following tables:

*Coal product of New Mexico in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bernalillo | 7 | 267,400 | 1,530 | 2,207 | ..... | 271,137 | $404,145 | $1.50 | 164 | 588 |
| Colfax, Lincoln | 2 | 179,475 | 2,400 | 75 | ..... | 181,950 | 223,101 | 1.23 | 180 | 379 |
| Rio Arriba | 2 | 7,200 | ..... | 1,000 | ..... | 8,200 | 10,370 | 1.26 | 264 | 14 |
| San Juan, Santa Fe | 5 | 153,244 | 2,747 | 4,164 | 1,184 | 161,339 | 292,765 | 1.82 | 170 | 578 |
| Total | 16 | 607,319 | 6,677 | 7,446 | 1,184 | 622,626 | 930,381 | 1.49 | 172 | 1,559 |

*Coal product of New Mexico in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Bernalillo | 6 | 329,470 | 1,188 | 1,830 | 332,488 | $469,213 | $1.41 | 220 | 808 |
| Colfax | 3 | 157,000 | 4,424 | 2,039 | 163,463 | 195,443 | 1.20 | 160 | 407 |
| Santa Fe | 3 | 192,923 | 892 | 14,840 | 208,655 | 311,355 | 1.49 | 228 | 420 |
| Lincoln, Rio Arriba, San Juan | 3 | 10,030 | 1,340 | 1,005 | 12,375 | 15,600 | 1.26 | 265 | 24 |
| Total | 15 | 689,423 | 7,844 | 19,714 | 716,981 | 991,611 | 1.38 | 208 | 1,659 |

The following table shows the annual output of the Territory since 1882, with the value of the product since 1885. It is probable, however, that the values given for years prior to 1889 are too high. They were estimated on a basis of $3 per ton, which was evidently excessive:

*Coal product of New Mexico since 1882.*

| Year. | Short tons. | Value. | Year. | Short tons. | Value. |
|---|---|---|---|---|---|
| 1882 | 157,092 | ..... | 1890 | 375,777 | $504,390 |
| 1883 | 211,347 | ..... | 1891 | 462,328 | 779,018 |
| 1884 | 220,557 | ..... | 1892 | 661,330 | 1,074,251 |
| 1885 | 306,202 | $918,606 | 1893 | 665,094 | 979,044 |
| 1886 | 271,285 | 813,855 | 1894 | 597,196 | 935,857 |
| 1887 | 508,034 | 1,524,102 | 1895 | 720,654 | 1,072,520 |
| 1888 | 626,665 | 1,879,995 | 1896 | 622,626 | 930,381 |
| 1889 | 486,943 | 872,628 | 1897 | 716,981 | 991,611 |

In the following table the product since 1882 is shown by counties, together with the increase and decrease in 1897 as compared with 1896:

*Coal product of New Mexico since 1882, by counties.*

[Short tons.]

| County. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. |
|---|---|---|---|---|---|---|
| Bernalillo | 33,373 | 42,000 | 62,802 | 97,755 | 106,530 | 275,952 |
| Colfax | 91,798 | 112,089 | 102,513 | 135,833 | 87,708 | 154,875 |
| Rio Arriba | 12,000 | 17,240 | 11,203 | 14,958 | 7,000 | 11,000 |
| Santa Fe | 3,600 | 3,000 | 3,000 | 1,000 | 1,000 | 7,500 |
| Socorro | 16,321 | 37,018 | 41,039 | 56,656 | 69,047 | 58,707 |
| Total | 157,092 | 211,347 | 220,557 | 306,202 | 271,285 | 508,034 |

*Coal product of New Mexico since 1882, by counties*—Continued.

[Short tons.]

| County. | 1888. | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|---|
| Bernalillo | 300,000 | 233,059 | 181,647 | 76,515 | 248,911 | 278,691 |
| Colfax | 227,427 | 151,464 | 151,400 | 295,089 | 297,911 | 249,783 |
| Lincoln | ..... | 1,255 | 1,175 | 1,000 | 3,145 | 1,962 |
| Rio Arriba | 12,000 | 13,650 | 12,175 | 7,350 | 20,600 | 15,500 |
| Santa Fe | 25,200 | 34,870 | 22,770 | 16,500 | 36,780 | 118,892 |
| Socorro | 62,038 | 52,205 | ..... | 65,574 | 53,783 | ..... |
| Other counties | ..... | 440 | 6,610 | 300 | 200 | 266 |
| Total | 626,665 | 486,943 | 375,777 | 462,328 | 661,330 | 665,094 |

| County. | 1894. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|---|
| Bernalillo | 270,413 | 308,676 | 271,137 | 332,488 | 61,351 | ..... |
| Colfax | 114,985 | 187,102 | 179,415 | 163,463 | ..... | 15,952 |
| Lincoln | 2,655 | 3,125 | 2,535 | 75 | ..... | 2,460 |
| Rio Arriba | *a* 21,020 | 32,000 | 8,200 | *b* 12,300 | 4,100 | ..... |
| Santa Fe | 187,923 | *b*189,751 | *b*161,339 | 208,655 | 47,316 | ..... |
| Socorro | ..... | ..... | ..... | ..... | ..... | ..... |
| Other counties | 200 | ..... | ..... | ..... | ..... | ..... |
| Total | 597,196 | 720,654 | 622,626 | 716,981 | *c* 94,355 | ..... |

*a* Including Union County. *b* Including San Juan County. *c* Net increase.

The average price per ton and the statistics of labor and average working time in the more important counties for a series of years are shown in the following tables:

*Average prices for New Mexico coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Bernalillo | $1.70 | $1.14 | $1.47 | $1.45 | $1.42 | $1.44 | $1.43 | $1.50 | $1.41 |
| Colfax | 1.33 | 1.31 | 1.35 | 1.33 | 1.31 | 1.25 | 1.20 | 1.18 | 1.20 |
| Rio Arriba | 1.82 | 1.72 | 1.95 | 1.50 | 1.30 | 1.25 | 1.53 | ..... | 1.25 |
| Santa Fe | 2.14 | 2.29 | 2.13 | 2.63 | 2.13 | 1.96 | 1.83 | 1.82 | 1.49 |
| Socorro | 3.29 | ..... | 3.22 | 3.43 | ..... | ..... | ..... | ..... | ..... |
| Territory | 1.79 | 1.34 | 1.68 | 1.62 | 1.47 | 1.57 | 1.49 | 1.49 | 1.38 |

*Statistics of labor employed and working time at New Mexico coal mines.*

| County. | 1890. | | 1891. | | 1892 | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Bernalillo | 375 | ..... | 187 | ..... | 449 | 179 | 370 | 196 |
| Colfax | 360 | ..... | 384 | ..... | 370 | 261 | 272 | 248 |
| Rio Arriba | 20 | ..... | 20 | ..... | 35 | 270 | 25 | 250 |
| Santa Fe | 55 | ..... | 36 | ..... | 30 | 267 | 328 | 257 |
| Socorro | ..... | ..... | 175 | ..... | 180 | 253 | ..... | ..... |
| Territory | 827 | ..... | 806 | ..... | 1,083 | 223 | 1,011 | 229 |

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Bernalillo | 460 | 192 | 549 | 183 | 588 | 164 | 808 | 220 |
| Colfax | 136 | 111 | 332 | 154 | 375 | 180 | 407 | 160 |
| Rio Arriba | 25 | 300 | 40 | 284 | ..... | ..... | 20 | 310 |
| Santa Fe | 343 | 193 | 455 | 218 | 576 | 170 | 420 | 228 |
| Territory | 985 | 182 | 1,383 | 190 | 1,559 | 172 | 1,659 | 208 |

## NORTH CAROLINA.

Total product in 1897, 21,280 short tons; spot value, $27,000.

The only product reported in 1897 was from the Cumnock mine in Chatham County. The product of 21,280 tons shows that the mine has recovered from the effects of the disastrous explosion in December, 1895, although the property is still in the hands of a receiver. The necessity for the receivership arose from the suits for damages instituted by those injured and by the heirs of those killed at the time of the accident.

The history of coal mining in the State dates from 1889. The Egypt mines, now called the Cumnock, were opened in December of that year, and yielded 192 tons. Since that time the product annually has been as follows:

*Coal product of North Carolina since 1889.*

| Year. | Short tons. | Value. | Year. | Short tons. | Value. |
|---|---|---|---|---|---|
| 1889 | 192 | $451 | 1894 | 16,900 | $29,675 |
| 1890 | 10,262 | 17,864 | 1895 | 24,900 | 41,350 |
| 1891 | 20,355 | 39,635 | 1896 | 7,813 | 11,720 |
| 1892 | 6,679 | 9,599 | 1897 | 21,280 | 27,000 |
| 1893 | 17,000 | 25,500 | | | |

*Coal product of North Carolina for seven years.*

| Year. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| 1891 | 1 | 18,780 | 600 | 975 | 20,335 | $39,635 | $1.93 | 254 | 80 |
| 1892 | 1 | 6,679 | ..... | ..... | 6,679 | 9,599 | 1.44 | 160 | 90 |
| 1893 | 1 | 15,000 | ..... | 2,000 | 17,000 | 25,500 | 1.50 | 80 | 70 |
| 1894 | 1 | 13,500 | 1,000 | 2,400 | 16,900 | 29,575 | 1.76 | 145 | 95 |
| 1895 | 3 | 23,400 | 600 | 900 | 24,900 | 41,350 | 1.66 | 226 | 61 |
| 1896 | 1 | 5,356 | 295 | 2,162 | 7,813 | 11,720 | 1.50 | 220 | 18 |
| 1897 | 1 | 21,280 | ..... | ..... | 21,280 | 27,000 | 1.34 | 215 | 51 |

## NORTH DAKOTA.

Total product in 1897, 77,246 short tons; spot value, $83,803.

The coal product of North Dakota in 1897 was not materially different from that of the year before, a slight decrease of 800 tons being noted. There were no strikes, and the conditions were about the same as in 1896, except that there were two mining machines in use in 1897 and only one in 1896, and the machine-mined product increased from 15,000 to 20,000 tons.

Some complaint was made in 1897 that the reports of the Survey neglected to record the "important" production of lignite coal in Burleigh County. In order to correct this omission an exhaustive investigation by correspondence was inaugurated. The result showed that there were a few small banks in the county from which farmers in the vicinity drew their winter supply of fuel. Little, if any, account was kept of the amount so mined, and as far as diligent inquiry could ascertain the total product amounted to about 2,800 tons, which is included in the table for 1897 shown on the following page:

*Coal product of North Dakota in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Morton | 4 | 24,477 | 408 | 45 | 24,930 | $25,608 | $1.03 | 166 | 57 |
| Stark | 4 | 34,000 | 4,525 | 375 | 38,900 | 41,275 | 1.06 | 162 | 50 |
| McLean, Ward | 2 | 12,970 | 1,250 | ..... | 14,220 | 18,025 | 1.27 | 173 | 34 |
| Total | 10 | 71,447 | 6,183 | 420 | 78,050 | 84,908 | 1.09 | 166 | 141 |

*Coal product of North Dakota in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees |
|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Burleigh | 4 | ..... | 2,750 | 115 | 2,865 | $2,488 | $0.87 | 101 | 15 |
| Emmons | 2 | ..... | 800 | 20 | 820 | 2,116 | 2.52 | 130 | 6 |
| McLean, Ward | 6 | 14,500 | 3,525 | 65 | 18,090 | 24,045 | 1.33 | 177 | 54 |
| Morton | 5 | 28,532 | 683 | 56 | 29,271 | 29,410 | 1.00 | 154 | 69 |
| Stark | 3 | 22,000 | 2,700 | 1,500 | 26,200 | 25,744 | .98 | 233 | 26 |
| Total | 20 | 65,032 | 10,458 | 1,756 | 77,246 | 83,803 | 1.08 | 168 | 170 |

*Coal product of North Dakota since 1884.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1884 | 35,000 | 1891 | 30,000 |
| 1885 | 25,000 | 1892 | 40,725 |
| 1886 | 25,955 | 1893 | 49,630 |
| 1887 | 21,470 | 1894 | 42,015 |
| 1888 | 34,000 | 1895 | 38,997 |
| 1889 | 28,907 | 1896 | 78,050 |
| 1890 | 30,000 | 1897 | 77,246 |

## OHIO.

Total product in 1897, 12,196,942 short tons; spot value, $9,535,409.

Ohio was the principal sufferer by the miners' strike during the summer of 1897. More than 80 per cent of the total number of men employed in Ohio coal mines were out of work, on account of the strike, an average of seventy-eight days. It must not be considered, however, that all of this time would have been made if the strike had not occurred. Many of the men would have been idle part of the time on account of the usual light summer demand for fuel. This is shown by the fact that while 21,685 men out of a total of 26,410 were on strike an average of seventy-eight days each, the average working time made in the State was only thirteen days less than in 1896. The working time in 1896 was the equivalent of 4,105,500 working days for one man; in 1897 the total amount of working time was 3,908,680 days, showing a loss of 196,820 days, or not quite 5 per cent. The loss in tonnage was 678,260, or a little more than 5 per cent. This shows a slight decrease in the individual capacity of the operatives, notwithstanding the increase of about 475,000 tons in the product mined by machines.

If the comparison of the total working time in the two years be neglected, and only the statistics of the strike be considered, it appears that the total time lost was 1,690,549 working days, practically 40 per cent of the entire working time in 1896.

In the tonnage lost by Ohio in 1897, the State is made responsible for 90 per cent of the decrease in production among the bituminous coal producing States. There were only two other States and one Territory in which the production was less in 1897 than in 1896—Georgia, Indian Territory, and North Dakota—their total losses aggregating 73,447 short tons.

The labor troubles in 1897 were distributed among the coal producing counties as follows:

*Strikes in Ohio coal mines in 1897.*

| County. | Number of mines where strikes occurred. | Number of men on strike. | Average number of days idle. | Total number of working days lost. |
|---|---|---|---|---|
| Athens | 23 | 2,249 | 73¼ | 165,351 |
| Belmont | 22 | 1,375 | 69 | 94,701 |
| Carroll | 2 | 275 | 72 | 19,895 |
| Columbiana | 13 | 1,393 | 68 | 94,330 |
| Coshocton | 7 | 458 | 63 | 28,880 |
| Guernsey | 9 | 1,208 | 66 | 79,620 |
| Hocking | 13 | 2,389 | 70 | 167,679 |
| Jackson | 29 | 3,840 | 81¼ | 313,028 |
| Jefferson | 6 | 1,204 | 73 | 87,380 |
| Lawrence | 1 | 65 | 47 | 3,055 |
| Mahoning | 4 | 90 | 58 | 5,233 |
| Medina | 6 | 321 | 57 | 18,159 |
| Meigs | 5 | 320 | 130 | 41,695 |
| Morgan | 1 | 40 | 60 | 2,400 |
| Muskingum | 4 | 119 | 57 | 6,875 |
| Noble | 1 | 58 | 76 | 4,408 |
| Perry | 36 | 2,774 | 81 | 224,687 |
| Portage | 3 | 239 | 122 | 29,158 |
| Stark | 20 | 1,771 | 110 | 194,372 |
| Summit | 1 | 106 | 78 | 8,268 |
| Tuscarawas | 16 | 1,074 | 71 | 76,124 |
| Vinton | 4 | 164 | 71 | 11,616 |
| Wayne | 2 | 153 | 89 | 13,635 |
| The State | 228 | 21,685 | 78 | 1,690,549 |

It appears from the foregoing statement that Jackson County was the one suffering the greatest loss in working time. The production in this county was 66,575 tons less than in 1896. Perry County lost 224,687

working days on account of the strike, and the production of the county decreased 127,373 short tons. Stark County lost 194,372 working days and 323,553 short tons in production. Hocking County lost 167,679 working days, but the output fell off only 3,561 tons, due to the fact that the mines in that county are all large ones, having an average production of about 80,000 tons, and the effects of the strike were readily overcome. Athens County miners lost 165,351 days of working time, and the production of the county decreased 244,499 short tons.

The number of mining machines in use increased from 209 in 1896 to 224 in 1897, eight firms adding this equipment to their properties during the year, and increasing the number of firms using machines from thirty-one to thirty-nine. The amount of coal mined with machines in 1897 was 3,843,345 short tons against 3,368,349 in 1896.

### PRODUCTION BY COUNTIES.

There are four counties in the State whose annual product has exceeded 1,000,000 tons for the past six years, while in the five years 1892 to 1896, inclusive, their average annual product exceeded 1,500,000 tons. These counties are Athens, Hocking, Jackson, and Perry. The product of each decreased in 1897. Athens experienced the heaviest loss, amounting to 244,499 tons, or about 20 per cent, and the product of Perry County fell off 127,373 tons, or 7.4 per cent. The combined product of the four counties decreased from 6,165,407 short tons to 5,723,399 short tons. Three of these counties, Athens, Hocking, and Perry, comprise what is known as the Hocking Valley region. The product of this region in 1897 was 375,000 tons less than in 1896.

Perry County continued in first place during 1897, having superseded Jackson County in 1896. Jackson County remains in second place and Hocking, Athens, Guernsey, Belmont, Columbiana, and Jefferson follow in the order named, Guernsey, Belmont, Columbiana, and Jefferson all outranking Stark, which occupied fifth place in 1896, and dropped, with a decrease of 33 per cent in tonnage, to ninth place in 1897. Twenty mines, employing 1,771 men, out of a total of 27 mines with 2,234 men in that county were idle for one hundred and ten days on account of the strike in 1897, and the average working time fell off from two hundred and six days in 1896 to one hundred and thirty-one days in 1897. As there was a difference of only 107 in the number of men employed in the two years the cause of decrease is readily discernible.

The details of production in 1896 and 1897, by counties, are shown in the following tables:

*Coal product of Ohio in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Athens | 27 | 1,316,361 | 21,833 | 37,295 | 22,652 | 1,398,141 | $969,466 | $0.69 | 163 | 2,705 |
| Belmont | 38 | 759,149 | 157,758 | 2,169 | ..... | 919,076 | 639,770 | .70 | 152 | 1,701 |
| Carroll | 9 | 259,116 | 28,836 | 1,165 | ..... | 289,117 | 219,016 | .76 | 172 | 729 |
| Columbiana | 25 | 485,047 | 44,716 | 4,934 | ..... | 534,697 | 436,425 | .82 | 181 | 1,460 |
| Coshocton | 12 | 346,901 | 11,803 | 675 | ..... | 359,379 | 281,811 | .78 | 202 | 557 |
| Guernsey | 15 | 935,795 | 11,899 | 7,763 | ..... | 955,457 | 624,107 | .65 | 193 | 1,357 |
| Hocking | 18 | 1,379,245 | 13,400 | 22,823 | ..... | 1,415,468 | 956,906 | .68 | 131 | 2,431 |
| Jackson | 37 | 1,552,296 | 54,100 | 22,830 | ..... | 1,629,226 | 1,446,929 | .89 | 145 | 3,972 |
| Jefferson | 34 | 587,385 | 93,622 | 2,962 | 3,943 | 687,912 | 526,828 | .79 | 138 | 1,499 |
| Lawrence | 9 | 40,763 | 10,784 | 50 | ..... | 51,597 | 41,610 | .81 | 125 | 171 |
| Mahoning | 15 | 8,417 | 15,946 | 330 | ..... | 24,693 | 29,027 | 1.18 | 106 | 153 |
| Medina | 6 | 183,492 | 4,934 | 5,678 | ..... | 194,104 | 194,075 | 1.00 | 181 | 431 |
| Meigs | 12 | 177,197 | 78,275 | 3,914 | ..... | 259,386 | 216,969 | .84 | 176 | 587 |
| Morgan | 2 | 16,294 | ..... | ..... | ..... | 16,294 | 11,877 | .73 | 141 | 77 |
| Muskingum | 14 | 110,850 | 1,383 | 100 | ..... | 112,333 | 80,632 | .72 | 193 | 216 |
| Perry | 52 | 1,664,943 | 37,479 | 20,150 | ..... | 1,722,572 | 1,221,231 | .71 | 161 | 3,091 |
| Portage | 4 | 44,655 | 1,940 | 1,782 | ..... | 48,377 | 64,218 | 1.33 | 118 | 301 |
| Stark | 28 | 909,985 | 20,453 | 32,180 | ..... | 962,618 | 1,043,067 | 1.08 | 206 | 2,127 |
| Summit | 3 | 18,471 | 4,999 | ..... | ..... | 23,470 | 37,897 | 1.61 | 197 | 92 |
| Trumbull | 3 | 1,562 | 718 | ..... | ..... | 2,280 | 3,820 | 1.68 | 61 | 26 |
| Tuscarawas | 29 | 586,807 | 51,218 | 3,062 | ..... | 641,087 | 500,880 | .78 | 148 | 1,412 |
| Vinton | 5 | 37,669 | 1,470 | 300 | ..... | 39,439 | 36,871 | .93 | 128 | 182 |
| Washington | 3 | ..... | 3,320 | ..... | ..... | 3,320 | 3,320 | 1.00 | 107 | 18 |
| Wayne | 4 | 50,198 | 3,860 | 1,380 | ..... | 55,438 | 46,969 | .85 | 151 | 119 |
| Gallia, Harrison | 2 | 2,080 | 2,504 | ..... | ..... | 4,584 | 3,737 | .82 | 110 | 34 |
| Noble, Scioto | 2 | 19,597 | 4,360 | 1,180 | ..... | 25,137 | 15,003 | .60 | 228 | 52 |
| Small mines | ..... | ..... | 500,000 | ..... | ..... | 500,000 | 600,000 | ..... | ..... | ..... |
| Total | 408 | 11,494,275 | 1,181,610 | 172,722 | 26,595 | 12,875,202 | 10,253,461 | .79 | 161 | 25,500 |

*Coal product of Ohio in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Athens | 26 | 1,077,711 | 19,041 | 38,737 | 18,153 | 1,153,642 | $776,155 | $0.67 | 140 | 2,472 |
| Belmont | 30 | 734,566 | 87,742 | 5,112 | ..... | 827,420 | 586,812 | .71 | 161 | 1,818 |
| Carroll | 7 | 135,048 | 11,683 | 700 | 500 | 147,931 | 111,385 | .75 | 155 | 384 |
| Columbiana | 20 | 691,498 | 78,976 | 4,262 | ..... | 774,736 | 555,127 | .72 | 206 | 1,413 |
| Coshocton | 9 | 322,331 | 20,458 | 800 | ..... | 343,589 | 256,791 | .75 | 192 | 487 |
| Guernsey | 11 | 891,880 | 6,836 | 11,838 | ..... | 910,554 | 558,362 | .61 | 180 | 1,401 |
| Hocking | 15 | 1,376,365 | 12,097 | 23,445 | ..... | 1,411,907 | 942,063 | .67 | 133 | 2,461 |
| Jackson | 34 | 1,461,592 | 71,032 | 30,027 | ..... | 1,562,651 | 1,389,205 | .89 | 137 | 4,308 |
| Jefferson | 21 | 625,848 | 122,077 | 2,731 | 1,197 | 751,848 | 582,148 | .77 | 161 | 1,500 |
| Lawrence | 7 | 77,771 | 9,444 | 125 | ..... | 87,340 | 66,699 | .76 | 173 | 297 |
| Mahoning | 9 | 29,281 | 7,303 | 703 | ..... | 37,287 | 28,181 | .76 | 177 | 117 |
| Medina | 7 | 159,816 | 4,566 | 6,030 | ..... | 170,412 | 181,173 | 1.06 | 154 | 396 |
| Meigs | 11 | 72,543 | 103,631 | 8,023 | ..... | 184,197 | 159,058 | .86 | 185 | 501 |
| Morgan | 2 | 21,965 | ..... | ..... | ..... | 21,965 | 16,909 | .77 | 109 | 145 |
| Muskingum | 11 | 84,945 | 46,361 | 300 | ..... | 131,606 | 120,334 | .91 | 145 | 394 |
| Perry | 49 | 1,525,191 | 39,208 | 30,800 | ..... | 1,595,199 | 1,132,510 | .71 | 128 | 3,624 |
| Portage | 4 | 55,975 | 21,232 | 2,030 | ..... | 79,237 | 107,889 | 1.36 | 129 | 306 |
| Stark | 27 | 595,507 | 27,258 | 16,300 | ..... | 639,065 | 677,607 | 1.06 | 131 | 2,284 |
| Summit | 4 | 42,594 | 6,569 | 3,010 | ..... | 52,173 | 60,760 | 1.16 | 132 | 156 |
| Trumbull | 3 | 11,000 | 1,407 | 200 | ..... | 12,607 | 20,700 | 1.64 | 153 | 40 |
| Tuscarawas | 29 | 582,317 | 41,808 | 2,847 | ..... | 626,972 | 450,522 | .72 | 140 | 1,478 |
| Vinton | 5 | 52,054 | 951 | 1,000 | ..... | 54,005 | 51,224 | .95 | 173 | 175 |
| Washington | 3 | 1,120 | 1,010 | ..... | ..... | 2,130 | 2,088 | .98 | 82 | 22 |
| Wayne | 2 | 58,473 | 300 | 3,000 | ..... | 61,773 | 63,624 | 1.03 | 149 | 159 |
| Gallia, Scioto | 2 | ..... | 17,872 | ..... | ..... | 17,872 | 12,260 | .69 | 214 | 44 |
| Harrison, Noble | 2 | 37,661 | 428 | 735 | ..... | 38,824 | 25,823 | .67 | 191 | 78 |
| Small mines | ..... | ..... | 500,000 | ..... | ..... | 500,000 | 600,000 | ..... | ..... | ..... |
| Total | 350 | 10,725,047 | 1,259,290 | 192,755 | 19,850 | 12,196,942 | 9,535,409 | .78 | 148 | 26,410 |

The following table shows the annual output of the State since 1884, by counties:

*Coal product of Ohio since 1884, by counties.*

[Short tons.]

| County. | 1884. | 1885. | 1886. | 1887. | 1888. |
|---|---|---|---|---|---|
| Athens | 627,944 | 823,139 | 899,046 | 1,083,543 | 1,336,698 |
| Belmont | 643,129 | 744,446 | 573,779 | 721,767 | 1,108,106 |
| Carroll | 102,531 | 150,695 | 216,630 | 293,328 | 355,097 |
| Columbiana | 469,708 | 462,733 | 336,063 | 516,057 | 466,191 |
| Coshocton | 56,562 | 99,609 | 52,934 | 124,791 | 167,903 |
| Gallia | 20,372 | 16,383 | 17,424 | 15,365 | 16,722 |
| Guernsey | 375,427 | 297,267 | 433,800 | 553,613 | 383,728 |
| Harrison | ..... | ..... | 5,509 | 4,032 | 2,865 |
| Hocking | 372,694 | 656,441 | 741,571 | 853,063 | 1,086,538 |
| Holmes | 12,052 | 11,459 | 12,670 | 10,526 | 8,121 |
| Jackson | 831,720 | 791,608 | 856,740 | 1,134,705 | 1,088,761 |
| Jefferson | 316,777 | 271,329 | 275,666 | 293,875 | 243,178 |
| Lawrence | 176,412 | 145,916 | 166,933 | 143,559 | 137,806 |
| Mahoning | 241,599 | 275,944 | 313,040 | 272,349 | 231,035 |
| Medina | 77,160 | 152,721 | 252,411 | 225,487 | 198,452 |
| Meigs | 248,436 | 234,756 | 192,263 | 185,205 | 242,483 |
| Morgan | 7,636 | 5,536 | 4,370 | 4,100 | ..... |
| Muskingum | 84,398 | 86,846 | 96,601 | 171,928 | 211,861 |
| Noble | ..... | ..... | 3,342 | 6,320 | 6,200 |
| Perry | 1,379,100 | 1,259,592 | 1,607,666 | 1,870,840 | 1,736,805 |
| Portage | 65,647 | 77,071 | 70,339 | 65,163 | 70,923 |
| Scioto | 3,650 | 2,440 | ..... | ..... | ..... |
| Stark | 513,225 | 391,418 | 593,422 | 784,164 | 793,227 |
| Summit | 253,148 | 145,134 | 82,225 | 95,815 | 112,024 |
| Trumbull | 257,683 | 264,517 | 188,531 | 167,989 | 157,826 |
| Tuscarawas | 317,141 | 285,545 | 267,666 | 506,466 | 546,117 |
| Vinton | 69,740 | 77,127 | 60,013 | 89,727 | 108,695 |
| Washington | 5,600 | 5,000 | 5,509 | 1,880 | 2,432 |
| Wayne | 120,571 | 81,507 | 109,057 | 105,150 | 91,157 |
| Total | 7,640,062 | 7,816,179 | 8,435,211 | 10,300,807 | 10,910,951 |

*Coal product of Ohio since 1884, by counties*—Continued.

[Short tons.]

| County. | 1889. | 1890. | 1891. | 1892. | 1893. |
|---|---|---|---|---|---|
| Athens | 1,224,186 | 1,205,455 | 1,482,294 | 1,400,865 | 1,597,685 |
| Belmont | 641,862 | 774,110 | 819,236 | 1,037,700 | 974,043 |
| Carroll | 351,782 | 328,967 | 313,543 | 367,055 | 261,327 |
| Columbiana | 596,824 | 567,595 | 621,726 | 520,755 | 467,314 |
| Coshocton | 166,599 | 177,700 | 189,469 | 228,727 | 244,605 |
| Gallia | 23,208 | 16,512 | 17,493 | 19,000 | 11,393 |
| Guernsey | 362,168 | 413,739 | 390,418 | 455,997 | 412,395 |
| Harrison | 33,724 | 8,600 | 3,960 | 3,220 | 2,640 |
| Hocking | 845,049 | 1,319,427 | 1,515,719 | 1,786,303 | 1,637,052 |
| Jackson | 926,874 | 970,878 | 1,475,939 | 1,833,910 | 1,826,572 |
| Jefferson | 271,830 | 491,172 | 697,193 | 932,477 | 1,077,779 |
| Lawrence | 102,656 | 77,004 | 76,235 | 71,376 | 36,512 |
| Mahoning | 240,563 | 256,319 | 200,734 | 205,105 | 173,704 |
| Medina | 136,061 | 139,742 | 160,184 | 101,440 | 153,100 |
| Meigs | 220,277 | 255,365 | 282,094 | 266,044 | 228,534 |
| Morgan | 8,060 | ..... | ..... | 12,000 | 10,000 |
| Muskingum | 214,005 | 229,719 | 160,154 | 177,488 | 205,966 |
| Noble | 38,400 | 6,850 | 3,800 | 300 | ..... |
| Perry | 1,565,786 | 1,921,417 | 1,785,626 | 1,452,979 | 1,438,123 |
| Portage | 78,117 | 70,666 | 69,058 | 76,398 | 89,431 |
| Stark | 851,994 | 836,449 | 917,995 | 856,607 | 926,200 |
| Summit | 50,726 | 112,997 | 140,079 | 147,847 | 28,989 |
| Trumbull | 108,120 | 47,714 | 83,950 | 30,187 | 15,681 |
| Tuscarawas | 683,505 | 589,875 | 736,297 | 777,215 | 698,527 |
| Vinton | 102,040 | 80,716 | 98,166 | 83,113 | 72,976 |
| Washington | 18,045 | 5,990 | 5,950 | 44,720 | 646 |
| Wayne | 84,178 | 38,528 | 21,371 | 73,599 | 62,452 |
| Small mines | ..... | 550,000 | 600,000 | 600,000 | 600,000 |
| Total | 9,976,787 | 11,494,506 | 12,868,683 | 13,562,927 | 13,253,646 |

*Coal product of Ohio since 1884, by counties*—Continued.

[Short tons.]

| County. | 1894. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|---|
| Athens | 1,508,900 | 1,433,226 | 1,398,141 | 1,153,642 | ..... | 244,499 |
| Belmont | 906,284 | 846,643 | 919,076 | 827,420 | ..... | 91,656 |
| Carroll | 263,293 | 260,879 | 289,117 | 147,931 | ..... | 141,186 |
| Columbiana | 558,280 | 617,654 | 534,697 | 774,736 | 240,039 | ..... |
| Coshocton | 166,427 | 207,620 | 359,379 | 343,589 | ..... | 15,790 |
| Gallia | 12,894 | 12,900 | 2,080 | 13,802 | 11,722 | ..... |
| Guernsey | 891,859 | 886,581 | 955,457 | 910,554 | ..... | 44,903 |
| Harrison | 1,701 | 3,472 | 2,504 | 5,886 | 3,382 | ..... |
| Hocking | 1,520,868 | 1,587,985 | 1,415,468 | 1,411,907 | ..... | 3,561 |
| Jackson | 1,511,950 | 2,005,384 | 1,629,226 | 1,562,651 | ..... | 66,575 |
| Jefferson | 851,200 | 885,322 | 687,912 | 751,848 | 63,936 | ..... |
| Lawrence | 57,179 | 88,502 | 51,597 | 87,340 | 35,743 | ..... |
| Mahoning | 42,748 | 42,482 | 24,693 | 37,287 | 12,594 | ..... |
| Medina | 110,787 | 264,171 | 194,104 | 170,412 | ..... | 23,692 |
| Meigs | 170,593 | 184,076 | 259,386 | 184,197 | ..... | 75,189 |
| Morgan | 8,236 | 16,000 | 16,294 | 21,965 | 5,671 | ..... |
| Muskingum | 109,334 | 103,860 | 112,333 | 131,606 | 19,273 | ..... |
| Perry | 1,599,025 | 1,711,944 | 1,722,572 | 1,595,199 | ..... | 127,373 |
| Portage | 90,094 | 86,576 | 48,377 | 79,237 | 30,860 | ..... |
| Stark | 452,950 | 779,733 | 962,618 | 639,065 | ..... | 323,553 |
| Summit | 14,510 | 25,606 | 23,470 | 52,173 | 28,703 | ..... |
| Trumbull | 2,278 | 15,801 | 2,280 | 12,607 | 10,327 | ..... |
| Tuscarawas | 485,024 | 657,094 | 641,087 | 626,972 | ..... | 14,115 |
| Vinton | 43,400 | 18,005 | 39,439 | 54,005 | 14,566 | ..... |
| Washington | ..... | 3,489 | 3,320 | 2,130 | ..... | 1,190 |
| Wayne | 30,042 | 110,801 | 55,438 | 61,773 | 6,335 | ..... |
| Noble, Scioto | ..... | ..... | 25,137 | 37,008 | 11,871 | ..... |
| Small mines | 500,000 | 500,000 | 500,000 | 500,000 | ..... | ..... |
| Total | 11,909,856 | 13,355,806 | 12,875,202 | 12,196,942 | ..... | a678,260 |

a Net decrease.

Records of the total production of coal in Ohio extend only as far back as 1872, since which time the annual output has been as follows:

*Annual coal product of Ohio since 1872.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1872 | 5,315,294 | 1885 | 7,816,179 |
| 1873 | 4,550,028 | 1886 | 8,435,211 |
| 1874 | 3,267,585 | 1887 | 10,300,708 |
| 1875 | 4,864,259 | 1888 | 10,910,951 |
| 1876 | 3,500,000 | 1889 | 9,976,787 |
| 1877 | 5,250,000 | 1890 | 11,494,506 |
| 1878 | 5,500,000 | 1891 | 12,868,683 |
| 1879 | 6,000,000 | 1892 | 13,562,927 |
| 1880 | 7,000,000 | 1893 | 13,253,646 |
| 1881 | 8,225,000 | 1894 | 11,909,856 |
| 1882 | 9,450,000 | 1895 | 13,355,806 |
| 1883 | 8,229,429 | 1896 | 12,875,202 |
| 1884 | 7,640,062 | 1897 | 12,196,942 |

Taken in connection with the preceding tables of production, the following tables, exhibiting the average prices and the statistics of labor for a series of years, will be found of interest:

*Average prices paid for Ohio coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Athens | $0.81 | $0.83 | $0.85 | $0.85 | $0.83 | $0.74 | $0.68 | $0.69 | $0.67 |
| Belmont | .87 | .78 | .84 | .84 | .81 | .71 | .72 | .70 | .71 |
| Carroll | .74 | .85 | .81 | .83 | .87 | .78 | .74 | .76 | .75 |
| Columbiana | .79 | .91 | .96 | .90 | .88 | .77 | .78 | .82 | .72 |
| Coshocton | .98 | .90 | 1.00 | 1.01 | 1.00 | .91 | .83 | .78 | .75 |
| Gallia | 1.04 | .90 | .92 | .92 | .91 | .85 | .80 | ..... | .69 |
| Guernsey | .87 | .68 | .79 | .72 | .71 | .63 | .58 | .65 | .61 |
| Hocking | .80 | .81 | .81 | .85 | .82 | .77 | .66 | .68 | .67 |
| Jackson | 1.03 | 1.00 | 1.06 | .99 | 1.06 | .97 | .90 | .89 | .89 |
| Jefferson | 1.00 | .83 | .85 | .92 | .79 | .71 | .70 | .79 | .77 |
| Lawrence | 1.04 | 1.08 | 1.04 | 1.06 | .94 | 1.03 | .92 | .81 | .76 |
| Mahoning | 1.12 | 1.20 | 1.25 | 1.41 | 1.44 | 1.40 | 1.28 | 1.18 | .76 |
| Medina | 1.16 | 1.20 | 1.16 | 1.23 | 1.25 | 1.13 | 1.06 | 1.00 | 1.06 |
| Meigs | 1.02 | 1.24 | .96 | 1.13 | 1.10 | 1.05 | .94 | .84 | .86 |
| Morgan | ..... | ..... | ..... | ..... | ..... | ..... | .80 | .73 | .77 |
| Muskingum | .99 | .86 | .82 | .91 | .83 | .89 | .83 | .72 | .91 |
| Noble | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .58 | .65 |
| Perry | .84 | .85 | .84 | .85 | .85 | .78 | .77 | .71 | .71 |

*Average prices paid for Ohio coal since 1889, etc.*—Continued.

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Portage | 1.27 | 1.59 | 1.52 | 1.52 | 1.55 | 1.52 | 1.32 | 1.33 | 1.36 |
| Stark | 1.26 | 1.30 | 1.25 | 1.22 | 1.24 | 1.19 | 1.02 | 1.08 | 1.06 |
| Summit | 1.83 | 1.50 | 1.38 | 1.43 | 1.73 | 1.67 | 1.41 | 1.61 | 1.16 |
| Trumbull | 1.64 | 1.20 | 1.41 | 1.54 | 1.54 | 1.87 | 1.31 | ..... | 1.64 |
| Tuscarawas | .80 | .85 | .79 | .85 | .84 | .66 | .71 | .78 | .72 |
| Vinton | 1.03 | 1.07 | 1.05 | 1.02 | .97 | .94 | .83 | .93 | .95 |
| Wayne | 1.23 | 1.07 | 1.15 | 1.30 | 1.27 | 1.22 | 1.09 | .85 | 1.03 |
| The State. | .94 | .94 | .94 | .94 | .92 | .83 | .79 | .79 | .78 |

*Statistics of labor employed and working time at Ohio coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Athens | 2,122 | 198 | 2,702 | 193 | 2,536 | 193 | 3,203 | 162 |
| Belmont | 1,401 | 201 | 1,276 | 238½ | 1,713 | 224 | 1,684 | 199 |
| Carroll | 642 | 188 | 589 | 200 | 595 | 214 | 652 | 166 |
| Columbiana | 987 | 219 | 1,031 | 251 | 932 | 223 | 964 | 210 |
| Coshocton | 327 | 237 | 284 | 265 | 336 | 229 | 398 | 233 |
| Gallia | 33 | 205 | 35 | 218 | 38 | 220 | 36 | 176 |
| Guernsey | 788 | 225 | 810 | 188 | 800 | 229 | 993 | 176 |
| Hocking | 1,625 | 240 | 1,674 | 241 | 2,099 | 216 | 2,072 | 193 |
| Jackson | 2,654 | 180 | 3,097 | 189 | 3,347 | 214 | 3,188 | 201 |
| Jefferson | 944 | 203 | 1,237 | 235 | 1,544 | 208 | 2,033 | 194 |
| Lawrence | 242 | 198 | 232 | 223 | 247 | 263 | 142 | 143 |
| Mahoning | 537 | 220 | 525 | 233½ | 484 | 206 | 419 | 196 |
| Medina | 310 | 219 | 314 | 221 | 175 | 255 | 349 | 228 |
| Meigs | 616 | 202 | 623 | 190 | 636 | 190 | 601 | 142 |
| Muskingum | 366 | 250 | 338 | 213 | 356 | 192 | 388 | 214 |
| Perry | 2,977 | 188 | 3,284 | 170 | 2,380 | 187 | 2,585 | 178 |
| Portage | 155 | 236 | 149 | 225 | 204 | 207 | 252 | 217 |
| Stark | 1,930 | 182 | 1,952 | 190 | 1,776 | 199 | 2,105 | 161 |
| Summit | 389 | 173 | 376 | 194 | 406 | 221 | 90 | 256 |
| Trumbull | 102 | 243 | 176 | 226 | 86 | 205 | 53 | 128 |
| Tuscarawas | 1,082 | 196 | 1,161 | 232 | 1,300 | 224 | 1,329 | 234 |
| Vinton | 186 | 241 | 197 | 206 | 197 | 198 | 179 | 200 |
| Wayne | 87 | 178 | 65 | 200 | 196 | 166 | 168 | 167 |
| The State. | 20,576 | 201 | 22,182 | 206 | 22,576 | 212 | 23,931 | 188 |

*Statistics of labor employed and working time at Ohio coal mines*—Continued.

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Athens | 3,445 | 124 | 2,556 | 155 | 2,705 | 163 | 2,472 | 140 |
| Belmont | 1,947 | 157 | 1,302 | 197 | 1,701 | 152 | 1,818 | 161 |
| Carroll | 466 | 133 | 482 | 148 | 729 | 172 | 384 | 155 |
| Columbiana | 1,417 | 161 | 1,204 | 228 | 1,460 | 181 | 1,413 | 206 |
| Coshocton | 451 | 168 | 395 | 175 | 557 | 202 | 487 | 192 |
| Gallia | 40 | 160 | 9 | 200 | ..... | ..... | 36 | 198 |
| Guernsey | 1,880 | 165 | 1,218 | 194 | 1,357 | 193 | 1,401 | 180 |
| Hocking | 2,549 | 122 | 2,501 | 198 | 2,431 | 131 | 2,461 | 133 |
| Jackson | 3,803 | 142 | 4,061 | 184 | 3,972 | 145 | 4,308 | 137 |
| Jefferson | 2,093 | 153 | 1,989 | 136 | 1,499 | 138 | 1,500 | 161 |
| Lawrence | 198 | 134 | 284 | 184 | 171 | 125 | 297 | 173 |
| Mahoning | 206 | 138 | 186 | 145 | 153 | 106 | 117 | 177 |
| Medina | 351 | 150 | 489 | 209 | 431 | 181 | 396 | 154 |
| Meigs | 584 | 146 | 612 | 151 | 587 | 176 | 501 | 185 |
| Morgan | ..... | ..... | 60 | 190 | 77 | 141 | 145 | 109 |
| Muskingum | 458 | 112 | 279 | 194 | 216 | 193 | 394 | 145 |
| Noble | ..... | ..... | ..... | ..... | 41 | 220 | 63 | 209 |
| Perry | 3,597 | 139 | 2,732 | 169 | 3,091 | 161 | 3,624 | 128 |
| Portage | 249 | 182 | 263 | 183 | 301 | 118 | 306 | 129 |
| Stark | 2,250 | 81 | 2,074 | 149 | 2,127 | 206 | 2,234 | 131 |
| Summit | 80 | 126 | 95 | 178 | 92 | 197 | 156 | 132 |
| Trumbull | 14 | 76 | 38 | 242 | ..... | ..... | 40 | 153 |
| Tuscarawas | 646 | 120 | 1,354 | 180 | 1,412 | 148 | 1,478 | 140 |
| Vinton | 155 | 115 | 38 | 226 | 182 | 128 | 175 | 173 |
| Wayne | 184 | 83 | 392 | 174 | 119 | 151 | 159 | 149 |
| The State. | 27,105 | 136 | 24,644 | 176 | 25,500 | 161 | 26,410 | 148 |

## OREGON.

Total production in 1897, 107,289 short tons; spot value, $291,772.

Coal production in Oregon in 1897 was not materially different from that in 1896, there being an increase in output of 5,568 short tons, or about 5.5 per cent. The most notable feature was a loss in value of $2,792, the average price declining from $2.90 to $2.72. Compared with the price of $3.36 per ton in 1895, there has been a decline in two years of 64 cents, or nearly 20 per cent.

The following tables show the statistics of production for the past six years and the total output since 1885:

*Coal product in Oregon since 1892.*

| Year. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average number of employees. | Average number of days worked. |
|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | |
| 1892 | 31,760 | 2,353 | 548 | 34,661 | $148,546 | 90 | 120 |
| 1893 | 37,835 | 3,594 | 254 | 41,683 | 164,500 | 110 | 192 |
| 1894 | 45,068 | 2,171 | 282 | 47,521 | 183,914 | 88 | 243 |
| 1895 | 68,108 | 5,294 | 283 | 73,685 | 247,901 | 414 | *a* 69 |
| 1896 | 88,116 | 12,951 | 654 | 101,721 | 294,564 | 254 | 191 |
| 1897 | 92,921 | 5,207 | 9,161 | 107,289 | 291,772 | 375 | 200 |

*a* The apparently large number of men employed and small average working time are due to the large force of men employed in developing the Beaver Hill mine, which was producing coal for shipment during only twenty days in 1895. The average time made at the Newport mines was over two hundred days per man.

*Coal product of Oregon from 1885 to 1897.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1885 | 50,000 | 1892 | 34,661 |
| 1886 | 45,000 | 1893 | 41,683 |
| 1887 | 37,696 | 1894 | 47,521 |
| 1888 | 75,000 | 1895 | 73,685 |
| 1889 | 64,359 | 1896 | 101,721 |
| 1890 | 61,514 | 1897 | 107,289 |
| 1891 | 51,826 | | |

Mr. J. S. Diller, of the United States Geological Survey, has made a reconnoissance of the geology of the coal fields of Oregon, and his report will be found in Part I of the Seventeenth Annual Report of the Survey.

## PENNSYLVANIA.

Total product in 1897, 95,562,191 long tons, or 107,029,654 short tons; spot value, $116,765,473. Anthracite: Total product, 46,814,074 long tons, or 52,431,763 short tons; spot value, $79,129,126. Bituminous: Total product, 48,748,117 long tons, or 54,597,891 short tons; spot value, $37,636,347.

Compared with 1896 the production of anthracite coal in Pennsylvania in 1897 shows a decrease of 1,709,213 long tons, or 1,914,319 short

tons, and a decrease in value of $2,619,525. The bituminous product increased 4,500,391 long tons, or 5,040,438 short tons, so that the total product of the State shows a net increase of 2,791,178 long tons, or 3,126,119 short tons. Owing to the decrease in the more valuable anthracite product, and a decline of 2 cents in the average price of the bituminous product, the total value of the product in 1897 was only $351,427 more than that of 1896, in spite of a net increase of over 3,000,000 tons in the output.

The production of anthracite reached its maximum figure in 1895, with a total of 51,785,122 long tons. The statistics of 1897 show that the output has fallen off nearly 10 per cent. Mr. William W. Ruley, the author of the anthracite section of this report, attributes the decrease in anthracite production to two causes, (1) the increasing use of bituminous coal for steaming purposes in competition with the small sizes of anthracite, and (2) the introduction of gas for domestic use. To the second reason may also be added the increased use of coke, which is now prepared in sizes suitable for kitchen use, and, as it makes a quick, hot fire, its use for cooking during the summer months is growing. Still a fourth cause is to be assigned, which is the decreasing production of pig iron with anthracite coal or a mixture of anthracite and coke. The output of all kinds of pig iron in 1897 was more than 1,000,000 long tons ahead of 1896, but the anthracite pig dropped off 213,635 long tons. Assuming that on an average anthracite furnaces use a mixture of one-third coke and two thirds anthracite coal, and that 2,000 pounds of coke or 2,500 pounds of anthracite are used per ton of pig, the decrease in the anthracite pig-iron product in 1897 was responsible for about 160,000 tons, or nearly 10 per cent, of the decrease in anthracite coal production.

Pennsylvania, as is well known, is by far the most important of the coal-producing States. It so completely outranks every other producing State, having in the combined product of anthracite and bituminous coal in 1897 more than five times the output of Illinois, which stands second, that comparisons are only of interest when drawn with reference to the ratio of Pennsylvania's output to that of the total in the United States or of the combined product of the other States. It is not possible to carry such comparisons back to an earlier date than 1880, owing to incomplete statistics in a number of the States. During 1880 the total output of coal in the United States was 63,822,830 long tons, or 71,481,569 short tons, of which Pennsylvania produced 42,437,242 long tons, or 47,529,711 short tons, or practically two-thirds of the total.

The product of Pennsylvania coal has always exceeded 50 per cent of the total product of the United States, the lowest percentage being 52, in 1884 and 1888. The average percentage for the eighteen years from 1880 to 1897, inclusive, was 55. In the following table is shown

the total product of Pennsylvania and the United States since 1880, with the percentage of the total produced by Pennsylvania in each year:

*Product of Pennsylvania coal compared with total United States since 1880.*

| Year. | Total United States. | Pennsylvania. | Per cent of Pennsylvania to total. |
|---|---|---|---|
| | *Short tons.* | *Short tons.* | |
| 1880 | 71,481,569 | 46,529,711 | 65 |
| 1881 | 85,881,030 | 54,320,018 | 63 |
| 1882 | 103,285,789 | 57,254,507 | 55 |
| 1883 | 115,212,125 | 62,488,190 | 54 |
| 1884 | 119,735,051 | 62,404,488 | 52 |
| 1885 | 110,957,522 | 62,137,271 | 56 |
| 1886 | 112,743,403 | 62,857,210 | 56 |
| 1887 | 129,975,557 | 70,372,857 | 54 |
| 1888 | 148,659,402 | 77,719,624 | 52 |
| 1889 | 141,229,514 | 81,719,059 | 58 |
| 1890 | 157,788,657 | 88,770,814 | 56 |
| 1891 | 168,566,668 | 93,453,921 | 55 |
| 1892 | 179,329,071 | 99,167,080 | 55 |
| 1893 | 182,352,774 | 98,038,267 | 54 |
| 1894 | 170,741,526 | 91,833,584 | 54 |
| 1895 | 193,117,530 | 108,216,565 | 56 |
| 1896 | 191,986,357 | 103,903,534 | 54 |
| 1897 | 200,064,730 | 107,029,654 | 53 |
| Total | 2,583,108,275 | 1,428,216,354 | 55 |

## PENNSYLVANIA ANTHRACITE.[1]

The anthracite coal trade for the year 1897 was far from satisfactory both in respect to the amount of coal sold and the prices received for it.

The falling off in production amounted to 1,709,213 long tons as compared with 1896, and even with this large decrease a very considerable amount of unsold coal was in stock at the close of the year, which will have an unfavorable effect upon the production for the current year.

When compared with the large production of 1895, the decrease in production for 1897 is even more noticeable, amounting to 4,971,048 long tons. In fact the amount of anthracite coal mined in the year 1897 was, with the exception of the year 1894, the smallest production

[1] By William W. Ruley, chief of Bureau of Anthracite Coal Statistics.

in the last six years. A glance at the figures for these years as given below will show the fluctuations in mining for the period named:

*Production of anthracite coal in Pennsylvania from 1892 to 1897.*

| Year. | Long tons. | Year. | Long tons. |
|---|---|---|---|
| 1892 | 46,850,450 | 1895 | 51,785,122 |
| 1893 | 48,185,306 | 1896 | 48,523,287 |
| 1894 | 46,358,144 | 1897 | 46,814,074 |

Of the total product of 46,814,074 long tons in 1897, 41,637,864 tons were shipped to market via the several railroads entering the anthracite regions, 1,134,637 tons were sold at or in the vicinity of the mines for local trade, and the balance, 4,041,573 tons, was used at the mines for steam and heat. This last item consists of small sizes, and from year to year smaller sizes have been used, until now it is largely made up of refuse coal and dirt, which would have little value as a marketable product, and, as in many cases the tonnage is approximated, this item has never been taken into account in making up the total value of coal at the mines, and the values given in the table represent only the coal shipped and sold locally at the mines.

The following table will show the total product, with its value and other details, for the years 1896 and 1897:

*Total product of anthracite coal in 1896 and 1897.*

| Year. | Total product. | Value at mines. | Average price per ton. | Number of persons employed. | Number of days worked. |
|---|---|---|---|---|---|
| | *Long tons.* | | | | |
| 1896 | 48,523,287 | $81,748,651 | $1.85 | 148,991 | 174 |
| 1897 | 46,814,074 | 79,129,126 | 1.85 | 149,557 | 150 |

From the above table it will be noted that the average price received for coal in 1897 was the same as for 1896. With the largely decreased tonnage, however, the total value of the coal at the mines was considerably less than in the previous year.

It will also be seen that in spite of the falling off in tonnage there was a slight increase in the number of men employed. The most noticeable feature, however, is the less number of days worked during the year, for while the product fell off only about 3.5 per cent, the working time was curtailed nearly 14 per cent. This would indicate a considerably greater efficiency in getting out coal, and should mean a decrease in the cost of production. The tonnage per man per day in 1897 was 2.09, against 1.87 in 1896.

As the statistics of production are compiled by counties, the following tables are given, showing the division of the total product according to shipments, coal sold to local trade, and used for steam in each anthracite producing county.

*Anthracite coal product in 1896, by counties.*

| County. | Total product. | Shipments. | Local trade. | Used at mines. |
|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Susquehanna..... | 429,506 | 383,719 | 7,787 | 38,000 |
| Lackawanna ..... | 12,450,297 | 11,476,552 | 252,026 | 721,719 |
| Luzerne..... | 17,803,196 | 15,952,297 | 361,595 | 1,489,304 |
| Carbon..... | 1,504,582 | 1,322,431 | 29,118 | 153,033 |
| Schuylkill..... | 10,902,343 | 9,421,684 | 194,010 | 1,286,649 |
| Columbia ..... | 659,849 | 553,593 | 13,021 | 93,235 |
| Northumberland.. | 4,083,136 | 3,549,337 | 119,290 | 414,509 |
| Dauphin ..... | 690,378 | 517,872 | 34,128 | 138,378 |
| Total ..... | 48,523,287 | 43,177,485 | 1,010,975 | 4,334,827 |

*Anthracite coal product in 1897, by counties.*

| County. | Total product. | Shipments. | Local trade. | Used at mines. |
|---|---|---|---|---|
| | *Long tons.* | *Long tons.* | *Long tons.* | *Long tons.* |
| Susquehanna..... | 430,515 | 393,002 | 7,513 | 30,000 |
| Lackawanna ..... | 11,925,360 | 10,894,558 | 274,921 | 755,881 |
| Luzerne..... | 17,024,539 | 15,218,196 | 424,757 | 1,381,586 |
| Carbon..... | 1,467,965 | 1,263,245 | 31,182 | 173,538 |
| Schuylkill ..... | 11,357,343 | 9,910,043 | 225,119 | 1,222,181 |
| Columbia ..... | 306,388 | 264,998 | 6,499 | 34,891 |
| Northumberland . | 3,639,122 | 3,195,160 | 104,646 | 339,316 |
| Dauphin ..... | 662,842 | 498,662 | 60,000 | 104,180 |
| Total ..... | 46,814,074 | 41,637,864 | 1,134,637 | 4,041,573 |

Below is given a table showing the shipments of coal from the three trade regions from the beginning of the industry in 1820 to the end of 1897. It must be borne in mind, however, that these figures do not include coal sold at the mines to local trade nor that used for steam at the mines, but only such coal as is loaded into cars for shipment.

*Annual shipments from the Schuylkill, Lehigh, and Wyoming regions from 1820 to 1897.*

| Year. | Schuylkill region. | | Lehigh region. | | Wyoming region. | | Total. |
|---|---|---|---|---|---|---|---|
| | Long tons. | Per cent. | Long tons. | Per cent. | Long tons. | Per cent. | Long tons. |
| 1820... | ..... | ..... | 365 | ..... | ..... | ..... | 365 |
| 1821... | ..... | ..... | 1,073 | ..... | ..... | ..... | 1,073 |
| 1822... | 1,480 | 39.79 | 2,240 | 60.21 | ..... | ..... | 3,720 |
| 1823... | 1,128 | 16.23 | 5,823 | 83.77 | ..... | ..... | 6,951 |
| 1824... | 1,567 | 14.10 | 9,541 | 85.90 | ..... | ..... | 11,108 |
| 1825... | 6,500 | 18.60 | 28,393 | 81.40 | ..... | ..... | 34,893 |
| 1826... | 16,767 | 34.90 | 31,280 | 65.10 | ..... | ..... | 48,047 |
| 1827... | 31,360 | 49.44 | 32,074 | 50.56 | ..... | ..... | 63,434 |
| 1828... | 47,284 | 61.00 | 30,232 | 39.00 | ..... | ..... | 77,516 |
| 1829... | 79,973 | 71.35 | 25,110 | 22.40 | 7,000 | 6.25 | 112,083 |
| 1830... | 89,984 | 51.50 | 41,750 | 23.90 | 43,000 | 24.60 | 174,734 |
| 1831... | 81,854 | 46.29 | 40,966 | 23.17 | 54,000 | 30.54 | 176,820 |
| 1832... | 209,271 | 57.61 | 70,000 | 19.27 | 84,000 | 23.12 | 363,271 |
| 1833... | 252,971 | 51.87 | 123,001 | 25.22 | 111,777 | 22.91 | 487,749 |
| 1834... | 226,692 | 60.19 | 106,244 | 28.21 | 43,700 | 11.60 | 376,636 |
| 1835... | 339,508 | 60.54 | 131,250 | 23.41 | 90,000 | 16.05 | 560,758 |
| 1836... | 432,045 | 63.16 | 148,211 | 21.66 | 103,861 | 15.18 | 684,117 |
| 1837... | 530,152 | 60.98 | 223,902 | 25.75 | 115,387 | 13.27 | 869,441 |
| 1838... | 446,875 | 60.49 | 213,615 | 28.92 | 78,207 | 10.59 | 738,697 |
| 1839... | 475,077 | 58.05 | 221,025 | 27.01 | 122,300 | 14.94 | 818,402 |
| 1840... | 490,596 | 56.75 | 225,313 | 26.07 | 148,470 | 17.18 | 864,379 |
| 1841... | 624,466 | 65.07 | 143,037 | 14.90 | 192,270 | 20.03 | 959,773 |
| 1842... | 583,273 | 52.62 | 272,540 | 24.59 | 252,599 | 22.79 | 1,108,412 |
| 1843... | 710,200 | 56.21 | 267,793 | 21.19 | 285,605 | 22.60 | 1,263,598 |
| 1844... | 887,937 | 54.45 | 377,002 | 23 12 | 365,911 | 22.43 | 1,630,850 |
| 1845... | 1,131,724 | 56.22 | 429,453 | 21.33 | 451,836 | 22.45 | 2,013,013 |
| 1846... | 1,308,500 | 55.82 | 517,116 | 22.07 | 518,389 | 22.11 | 2,344,005 |
| 1847... | 1,665,735 | 57.79 | 633,507 | 21.98 | 583,067 | 20.23 | 2,882,309 |
| 1848... | 1,733,721 | 56.12 | 670,321 | 21.70 | 685,196 | 22.18 | 3,089,238 |
| 1849... | 1,728,500 | 53.30 | 781,556 | 24.10 | 732,910 | 22.60 | 3,242,966 |
| 1850... | 1,840,620 | 54.80 | 690,456 | 20.56 | 827,823 | 24.64 | 3,358,899 |
| 1851... | 2,328,525 | 52.34 | 964,224 | 21.68 | 1,156,167 | 25.98 | 4,448,916 |
| 1852... | 2,636,835 | 52.81 | 1,072,136 | 21.47 | 1,284,500 | 25.72 | 4,993,471 |
| 1853... | 2,665,110 | 51.30 | 1,054,309 | 20.29 | 1,475,732 | 28.41 | 5,195,151 |
| 1854... | 3,191,670 | 53.14 | 1,207,186 | 20.13 | 1,603,478 | 26.73 | 6,002,334 |
| 1855... | 3,552,943 | 53.77 | 1,284,113 | 19.43 | 1,771,511 | 26.80 | 6,608,567 |
| 1856... | 3,603,029 | 52.91 | 1,351,970 | 19.52 | 1,972,581 | 28.47 | 6,927,580 |
| 1857... | 3,373,797 | 50.77 | 1,318,541 | 19.84 | 1,952,603 | 29.39 | 6,644,941 |
| 1858... | 3,273,245 | 47.86 | 1,380,030 | 20.18 | 2,186,094 | 31.96 | 6,839,369 |
| 1859... | 3,448,708 | 44.16 | 1,628,311 | 20.86 | 2,731,236 | 34.98 | 7,808,255 |
| 1860... | 3,749,632 | 44.04 | 1,821,674 | 21.40 | 2,941,817 | 34.56 | 8,513,123 |

*Annual shipments from the Schuylkill, Lehigh, and Wyoming regions, etc.*—Continued.

| Year. | Schuylkill region. | | Lehigh region. | | Wyoming region. | | Total. |
|---|---|---|---|---|---|---|---|
| | Long tons. | Per cent. | Long tons. | Per cent. | Long tons. | Per cent. | Long tons. |
| 1861... | 3,160,747 | 39.74 | 1,738,377 | 21.85 | 3,055,140 | 38.41 | 7,954,264 |
| 1862... | 3,372,583 | 42.86 | 1,351,054 | 17.17 | 3,145,770 | 39.97 | 7,869,407 |
| 1863... | 3,911,683 | 40.90 | 1,894,713 | 19.80 | 3,759,610 | 39.30 | 9,566,006 |
| 1864... | 4,161,970 | 40.89 | 2,054,669 | 20.19 | 3,960,836 | 38.92 | 10,177,475 |
| 1865... | 4,356,959 | 45.14 | 2,040,913 | 21.14 | 3,254,519 | 33.72 | 9,652,391 |
| 1866... | 5,787,902 | 45.56 | 2,179,364 | 17.15 | 4,736,616 | 37.29 | 12,703,882 |
| 1867... | 5,161,671 | 39.74 | 2,502,054 | 19.27 | 5,325,000 | 40.99 | 12,988,725 |
| 1868... | 5,330,737 | 38.52 | 2,502,582 | 18.13 | 5,968,146 | 43.25 | 13,801,465 |
| 1869... | 5,775,138 | 41.66 | 1,949,673 | 14.06 | 6,141,369 | 44.28 | 13,866,180 |
| 1870... | 4,968,157 | 30.70 | 3,239,374 | 20.02 | 7,974,660 | 49.28 | 16,182,191 |
| 1871... | 6,552,772 | 41.74 | 2,235,707 | 14.24 | 6,911,242 | 44.02 | 15,699,721 |
| 1872... | 6,694,890 | 34.03 | 3,873,339 | 19.70 | 9,101,549 | 46.27 | 19,669,778 |
| 1873... | 7,212,601 | 33.97 | 3,705,596 | 17.46 | 10,309,755 | 48.57 | 21,227,952 |
| 1874... | 6,866,877 | 34.09 | 3,773,836 | 18.73 | 9,504,408 | 47.18 | 20,145,121 |
| 1875... | 6,281,712 | 31.87 | 2,834,605 | 14.38 | 10,596,155 | 53.75 | 19,712,472 |
| 1876... | 6,221,934 | 33.63 | 3,854,919 | 20.84 | 8,424,158 | 45.53 | 18,501,011 |
| 1877... | 8,195,042 | 39.35 | 4,332,760 | 20.80 | 8,300,377 | 39.85 | 20,828,179 |
| 1878... | 6,282,226 | 35.68 | 3,237,449 | 18.40 | 8,085,587 | 45.92 | 17,605,262 |
| 1879... | 8,960,829 | 34.28 | 4,595,567 | 17.58 | 12,586,293 | 48.14 | 26,142,689 |
| 1880... | 7,554,742 | 32.23 | 4,463,221 | 19.05 | 11,419,279 | 48.72 | 23,437,242 |
| 1881... | 9,253,958 | 32.46 | 5,294,676 | 18.58 | 13,951,383 | 48.96 | 28,500,017 |
| 1882... | 9,459,288 | 32.48 | 5,689,437 | 19.54 | 13,971,371 | 47.98 | 29,120,096 |
| 1883... | 10,074,726 | 31.69 | 6,113,809 | 19.23 | 15,604,492 | 49.08 | 31,793,027 |
| 1884... | 9,478,314 | 30.85 | 5,562,226 | 18.11 | a15,677,753 | 51.04 | 30,718,293 |
| 1885... | 9,488,426 | 30.01 | 5,898,634 | 18.65 | a16,236,470 | 51.34 | 31,623,530 |
| 1886... | 9,381,407 | 29.19 | 5,723,129 | 17.89 | a17,031,826 | 52.82 | 32,136,362 |
| 1887... | 10,609,028 | 30.63 | 4,347,061 | 12.55 | a19,684,929 | 56.82 | 34,641,018 |
| 1888... | 10,654,116 | 27.93 | 5,639,236 | 14.78 | a21,852,366 | 57.29 | 38,145,718 |
| 1889... | 10,486,185 | 29.28 | 6,294,073 | 17.57 | a19,036,835 | 53.15 | 35,817,093 |
| 1890... | 10,867,822 | 29.68 | 6,329,658 | 17.28 | a19,417,979 | 53.04 | 36,615,459 |
| 1891... | 12,741,258 | 31.50 | 6,381,838 | 15.78 | 21,325,240 | 52.72 | 40,448,336 |
| 1892... | 12,626,784 | 30.14 | 6,451,076 | 15.40 | 22,815,480 | 54.46 | 41,893,340 |
| 1893... | 12,357,444 | 28.68 | 6,892,352 | 15.99 | 23,839,741 | 55.33 | 43,089,537 |
| 1894... | 12,035,005 | 29.08 | 6,705,434 | 16.20 | 22,650,761 | 54.72 | 41,391,200 |
| 1895... | 14,269,932 | 30.68 | 7,298,124 | 15.69 | 24,943,421 | 53.63 | 46,511,477 |
| 1896... | 13,097,571 | 30.34 | 6,490,441 | 15.03 | 23,589,473 | 54.63 | 43,177,485 |
| 1897... | 12,181,061 | 29.26 | 6,249,540 | 15.00 | 23,207,263 | 55.74 | 41,637,864 |
| Total | 353,672,751 | 34.16 | 181,297,199 | 17.47 | 502,370,259 | 48.42 | 1,037,340,209 |

a Includes Loyalsock field.

As noted in the report for 1896, the exceptionally large tonnage of 1895 was far beyond the consumptive demand for that year, and the effects of the excess, so manifest in the market during 1896, continued to exert their influence in a lessened degree throughout 1897.

Note is made in the beginning of this report of the falling off in tonnage for the year 1897 as compared with 1896, and the significance of the reduced production is accentuated when comparison is made with the bituminous-coal production in 1897. With very few exceptions the coal-producing States show an increase over 1896, which in some cases is large. In Pennsylvania this increase amounted to 4,500,391 long tons, while the increase of bituminous-coal production in the United States for the year 1897 over 1896 was 9,062,000 tons, compared with a decrease of 1,709,213 tons in the production of anthracite.

What conclusion is to be drawn from these facts and figures? It has been persistently contended, by those who think they see the ultimate doom of the anthracite industry, that this decrease in production indicates the encroachment of two competitive forces which will ultimately result in the undoing of anthracite. The first of these is the competition of bituminous coal with the small sizes of anthracite for steam purposes. That such competition exists, and that the bituminous often has the better of it, can not be doubted; but that bituminous will completely displace the small sizes of anthracite in the steam-coal market seems improbable, since the latter is used in thousands of places where the former coal would be altogether undesirable. The second of these factors is the growing use of gas as a substitute for coal in domestic uses. Unquestionably the use of gas for cooking and heating purposes in private houses is increasing; but that the domestic market for anthracite coal will be destroyed by it is altogether a different proposition. Those who contend that these factors will permanently narrow the market for anthracite seem to forget that the market for fuel is continually expanding and demanding more and more varied means of supply. It has been the almost universal experience that in a broad field the introduction of new methods and new materials has resulted, not in doing away entirely with the old, but in modifying and sometimes actually increasing their use, and at the same time in providing for the new by opening up new avenues of demand. When gas was introduced the prediction was made that it would altogether supersede oil, but the oil industry continued to grow; when electric light was first introduced it was to do away with gas, but the gas companies were never so prosperous as they are to-day.

So it is with anthracite coal. It has a place in the economy of the world to-day, and while, of course, its market will not grow to the same extent as if it had no competition, one would not be judging the present by past experience if he predicted any great contraction of the anthracite market, but should rather expect a reasonable expansion as the business of the country gradually regains its normal condition. In

fact, it would not be fair to judge of the future market of any commodity by the experience of the last few years, which have been years of universal business depression, but it would be more logical to infer that with the natural expansion and growth of trade under healthful conditions, the anthracite trade will come in for a share at least of the improvement and increase.

The prices received during the year have about equaled those of 1896. There was, however, considerable irregularity in the maintenance of the circular rates throughout the year. During the first six months rates were much better maintained than during the latter half of the year.

To give the reader an idea of the anthracite territory, a tabular arrangement of the fields and a short description is given below, together with the names of the railroads reaching the territory:

| *Geological field or basin.* | *Local district.* | *Trade region.* |
|---|---|---|
| Northern | Carbondale | Wyoming. |
| | Scranton | |
| | Pittston | |
| | Wilkesbarre | |
| | Plymouth | |
| | Kingston | |
| Eastern middle | Green Mountain | Lehigh. |
| | Black Creek | |
| | Hazleton | |
| | Beaver Meadow | |
| Southern | Panther Creek | Schuylkill. |
| | East Schuylkill | |
| | West Schuylkill | |
| | Lorberry | |
| | Lykens Valley | |
| Western middle | East Mahanoy | |
| | West Mahanoy | |
| | Shamokin | |

The above territory is reached by eleven so-called initial railroads, as follows:

Philadelphia and Reading Railway Company.
Lehigh Valley Railroad Company.
Central Railroad Company of New Jersey.
Delaware, Lackawanna and Western Railroad Company.
Delaware and Hudson Canal Company's Railroad.
Pennsylvania Railroad Company.
Erie and Wyoming Valley Railroad Company.
New York, Lake Erie and Western Railroad Company.
New York, Ontario and Western Railway Company.
Delaware, Susquehanna and Schuylkill Railroad Company.
New York, Susquehanna and Western Railroad Company.

*Directory of anthracite coal mines in Pennsylvania.*

NORTHERN COAL FIELD.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 15 | Erie | Carbondale | 1 | Carbondale Twp. | Lackawanna | D. and H. C. Co. R. R. | Glenwood | Hillside Coal and Iron Co. | Scranton. |
| 16 | Glenwood | do | 1 | do | do | do | do | do | Do. |
| 17 | Keystone | do | 1 | do | do | do | Archbald | do | Do. |
| 21 | Raymond | do | 1 | Blakely Twp | do | N. Y., O. and W. Rwy | do | Raymond Coal Co | Do. |
| 23 | Pierce | do | 1 | do | do | D., L. and W. R. R. | Winton | Pierce Coal Co., Limited | Winton. |
| 18 | Edgerton | do | 1 | do | do | Erie R. R | Jermyn | Edgerton Coal Co., Limited | Scranton. |
| 25 | Sterrick Creek | do | 1 | do | do | do | Winton | Sterrick Creek Coal Co | Do. |
| 36 | Johnson No. 1 | do | 1 | do | do | N. Y., S. and W. R. R. | Dickson | Johnson Coal Co | Do. |
| 35 | Johnson No. 2 | do | 1 | do | do | do | do | do | Do. |
| 28 | Marshwood | do | 1 | do | do | Erie R. R. | Peckville | Moosic Mountain Coal Co. | Marshwood. |
| 43 | Murray | do | 1 | Dunmore Twp. | do | D., L. and W. R. R | Scranton | Murray, Carney & Brown | Dunmore. |
| 5 | Northwest | do | 1 | Fell Twp | do | Erie R. R | Carbondale | Northwest Coal Co | Scranton. |
| 27 | White | do | 1 | Blakely Twp | do | N. Y., S. and W. R. R. | Winton | Winton Coal Co., Limited | Do. |
| 24 | Mount Jessup | do | 1 | do | do | D., L. and W. R. R. and N. Y., O. and W. Rwy. | do | Mount Jessup Coal Co., Limited. | Winton. |
| 33 | Olyphant | do | 1 | do | do | D. and H. C. Co. R. R. | Olyphant | D. and H. Canal Co | Providence. |
| 34 | Eddy Creek | do | 1 | do | do | do | do | do | Do. |
| 29 | Grassy Island | do | 1 | do | do | do | do | do | Do. |
| 20 | White Oak | do | 1 | do | do | do | Archbald | do | Do. |
| 19 | Jermyn Shaft | do | 1 | Carbondale Twp. | do | do | Jermyn | do | Do. |
| 11 | Coal Brook | do | 1 | do | do | do | Carbondale | do | Do. |
| 12 | No. 1 Shaft | do | 1 | do | do | do | do | do | Do. |
| 13 | No. 3 Shaft | do | 1 | do | do | do | do | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| | Russell B | Carbondale | 1 | Fell Twp | Lackawanna | N. Y., O. and W. Rwy | Carbondale | Russell B. Coal Co | Scranton. |
| | New Elk Creek | do | 1 | do | do | Erie R. R | do | Franklin Coal Co | Carbondale. |
| | Nay Aug | do | 2 | Dunmore Twp | do | L. V. R. R | Dunmore | Nay Aug Coal Co | Scranton. |
| 10 | Racket Brook | do | 1 | Carbondale Twp | do | D. and H. C. Co. R. R | Carbondale | D. and H. Canal Co | Providence. |
| 14 | Powderly | do | 1 | do | do | do | do | do | Do. |
| 3 | Clinton | do | 1 | Fell Twp | do | do | Forest City | do | Do. |
| 26 | Dolph | do | 1 | Blakely Twp | do | L. V. R. R | Jessup | Dolph Coal Co., Limited | Scranton. |
| 32 | Lackawanna | do | 1 | do | do | N. Y., O. and W. Rwy | Olyphant | Lackawanna Coal Co., Lim. | Do. |
| 31 | Ontario | do | 1 | do | do | do | Peckville | N. Y. and Scranton Coal Co. | Peckville. |
| 2 | Forest City | do | 1 | Forest City | Susquehanna | Erie R. R | Forest City | Hillside Coal and Iron Co. | Scranton. |
| 1 | Clifford | do | 1 | do | do | do | do | do | Do. |
| | West Ridge | do | 2 | do | Lackawanna | N. Y., O. and W. Rwy | West Ridge | West Ridge Coal Co | Do. |
| | Riverside | do | 1 | Archbald | do | do | Winton | Riverside Coal Co | Do. |
| 69 | Archbald | Scranton | 2 | Lackawanna Twp | do | D., L. and W. R. R | Scranton | D., L. and W. R. R. Co | Do. |
| 63 | Bellevue | do | 2 | do | do | do | Bellevue | do | Do. |
| 60 | Brisbin | do | 2 | 3d Ward, Scranton | do | do | Scranton | do | Do. |
| 59 | Cayuga | do | 2 | do | do | do | do | do | Do. |
| 68 | Continental | do | 2 | Lackawanna Twp | do | do | do | do | Do. |
| 64 | Dodge | do | 2 | do | do | do | Bellevue | do | Do. |
| 67 | Hampton | do | 2 | do | do | do | Scranton | do | Do. |
| 71 | Holden | do | 2 | do | do | do | Taylorville | do | Do. |
| 65 | Hyde Park | do | 2 | 5th Ward, Scranton | do | do | Scranton | do | Do. |
| 62 | Oxford | do | 2 | do | do | do | do | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 73 | Pyne | Scranton | 2 | Lackawanna Twp | Lackawanna | D., L. and W. R. R. | Taylorville | D., L. and W. R. R. Co | Scranton. |
| | Columbus | do | 2 | Scranton | do | N. Y., O. and W. Rwy | Scranton | Columbus Colliery Co | Do. |
| 70 | Sloan | do | 2 | Lackawanna Twp | do | D., L. and W. R. R. | do | D., L. and W. R. R. Co | Do. |
| 44 | Storrs | do | 2 | Blakely Twp | do | do | Priceville | do | Do. |
| 72 | Taylor | do | 2 | Lackawanna Twp | do | do | Taylorville | do | Do. |
| 61 | Diamond No. 1 | do | 2 | 21st Ward, Scranton | do | do | Scranton | do | Do. |
| | Diamond No. 2 | do | 2 | do | do | do | do | do | Do. |
| | Tripp Shaft | do | 2 | do | do | do | do | do | Do. |
| 38 | Dunmore No. 1 | do | 1 | Dunmore Twp | do | E and W. V. R. R. | Dunmore | Pennsylvania Coal Co | Dunmore. |
| 41 | Dunmore No. 5 | do | 2 | do | do | do | do | do | Do. |
| | Bunker Hill | do | 2 | do | do | do | do | do | Do. |
| 30 | Blue Ridge | do | 1 | do | do | N. Y., O. and W. Rwy | Peckville | Blue Ridge Coal Co | Peckville. |
| | Austin | do | 2 | Old Forge Twp | do | L. V. R. R. | Lackawanna | Austin Coal Co | Scranton. |
| 40 | Gypsy Grove No. 3 | do | 1 | Dunmore Twp | do | E. and W. V. R. R. | Dunmore | Pennsylvania Coal Co | Dunmore. |
| | Gypsy Grove No. 4 | do | 1 | do | do | do | do | do | Do. |
| 52 | Pine Brook | do | 2 | 7th Ward, Scranton | do | D., L. and W. R. R. | Scranton | Lackawanna I. and S. Co | Scranton. |
| 53 | Capouse | do | 2 | 21st Ward, Scranton | do | do | do | do | Do. |
| 76 | Greenwood No. 1 | do | 2 | Lackawanna Twp | do | N. Y., S. and W. R. R. | Peckville | Greenwood Coal Co., Lim | Do. |
| 77 | Greenwood No. 2 | do | 2 | do | do | do | Minooka | do | Do. |
| 80 | Jermyn Nos. 1 and 2 | do | 2 | Old Forge Twp | do | L. V. R. R. | Taylorville | Jermyn & Co | Do. |
| 37 | Pancoast | do | 1 | Blakely Twp | do | D., L. and W. R. R. | Dickson City | Pancoast Coal Co | Do. |
| 56 | Providence | do | 2 | 2d Ward, Scranton | do | do | Green Ridge | Providence Coal Co., Lim | Do. |
| 79 | Sibley | do | 2 | Old Forge Twp | do | L. V. R. R. | Lackawanna | Elliott, McClure & Co | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 42 | Spencer | Scranton | 2 | Dunmore Twp | Lackawanna | L. V. R. R. | Dunmore | A. D. and F. M. Spencer | Dunmore. |
| 74 | Meadow Brook | do | 2 | 20th Ward, Scranton | do | D., L. and W. R. R | Taylorville | William Connell & Co | Scranton. |
| 75 | National | do | 2 | do | do | do | do | do | Do. |
| 49 | Manville *a* | do | 2 | 13th Ward, Scranton | do | D. and H. C. Co. R. R. | Green Ridge | D. and H. Canal Co | Providence. |
| 46 | Leggitts Creek | do | 1 | 1st Ward, Scranton | do | do | Providence | do | Do. |
| 45 | Marvine | do | 1 | do | do | do | do | do | Do. |
| 48 | Von Storch | do | 2 | 2d Ward, Scranton | do | do | do | do | Do. |
| 47 | Dickson | do | 2 | do | do | do | Green Ridge | do | Do. |
| 50 | Green Ridge | do | 2 | Dunmore Twp | do | Erie R. R | do | O. S. Johnson | Scranton. |
| | Richmond, Nos. 3, 4 | do | 1 | Scranton Twp | do | N. Y., O. and W. Rwy | Providence | Elk Hill Coal and Iron Co | Do. |
| 57 | Mount Pleasant | do | 2 | 14th Ward, Scranton | do | D., L. and W. R. R | Scranton | Wm. T. Smith | Do. |
| 81 | William A | Pittston | 2 | Old Forge Twp | do | L. V. R. R. | Lackawanna | Connell Coal Co | Do. |
| | Lawrence | do | 2 | do | do | do | do | do | Do. |
| 88 | Katy-Did | do | 3 | do | do | Erie R. R | Moosic | Robertson & Co | Moosic. |
| 87 | Central No. 13 | do | 3 | do | do | E. and W. V. R. R | Pleasant Valley | Pennsylvania Coal Co | Dunmore. |
| | Law Shaft | do | 3 | Pittston Twp | do | do | do | do | Do. |
| 86 | Old Forge | do | 2 | Old Forge Twp | do | do | Lackawanna | do | Do. |
| 109 | Ewen Breaker | do | 3 | Jenkins Twp | Luzerne | do | Pittston | do | Do. |
| | Shaft No. 4 | do | 3 | do | do | do | do | do | Do. |
| 110 | Breaker No. 6 | do | 3 | do | do | do | Port Blanchard | do | Do. |
| | Breaker No. 8 | do | 3 | Hughestownboro | do | do | Pittston | do | Do. |
| 99 | Breaker No. 10 | do | 3 | do | do | do | do | do | Do. |

*a* Operated jointly with Delaware, Lackawanna and Western Railroad Company.

*Directory of anthracite coal mines in Pennsylvania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 111 | Breaker No. 14 | Pittston | 3 | Jenkins Twp | Luzerne | E. and W. V. R. R. | Port Blanchard | Pennsylvania Coal Co | Dunmore. |
| 100 | Barnum | do | 3 | Marcy Twp | do | do | Pittston Junction | do | Do. |
| 112 | Laflin | do | 3 | Jenkins Twp | do | L. V. R. R. | Laflin | Laflin Coal Co | Laflin. |
| | Crescent | do | 3 | do | do | do | Pittston | Crescent Coal Co | Wilkesbarre. |
| | Miner | do | 3 | do | do | do | Miners Mills | Wm. B. Miner | Do. |
| 91 | Avoca | do | 3 | Pittston Twp | do | do | Avoca | Avoca Coal Co., Limited | Avoca. |
| 90 | Langcliffe | do | 3 | Pittston | do | do | do | Langcliffe Coal Co | Do. |
| 101 | Twin | do | 3 | do | do | do | Pittston | Newton Coal Mining Co | Pittston. |
| | Ravine | do | 3 | do | do | do | do | do | Do. |
| 102 | Seneca | do | 3 | do | do | do | do | do | Do. |
| 98 | Mosier | do | 3 | Marcy Twp | do | do | do | do | Do. |
| 108 | Hunt | do | 3 | Kingston Twp | do | D., L. and W. R. R. | Wyoming | Wyoming C. and L. Co | Scranton. |
| 83 | Hallstead | do | 3 | Marcy Twp | do | do | Duryea | D., L. and W. R. R. Co | Do. |
| 95 | Butler | do | 3 | Pittston Twp | do | L. V. R. R. | Pittston | Butler Mine Co., Limited | Pittston. |
| | Chapman | do | 3 | do | do | do | do | do | Do. |
| | Fernwood | do | 3 | do | do | N. Y., S. and W. R. R. | do | do | Do. |
| 106 | Schooley | do | 3 | Exeter Twp | do | L. V. R. R. | West Pittston | Pennsylvania Coal Co | Dunmore. |
| 84 | Columbia | do | 3 | Marcy Twp | do | D., L. and W. R. R. and L. V. R. R. | Duryea | Old Forge C. Mng. Co | Pittston. |
| 85 | Phœnix | do | 3 | do | do | do | do | do | Do. |
| 82 | Babylon | do | 3 | do | do | L. V. R. R. | Coxton | Babylon Coal Co | Scranton. |
| 89 | Consolidated | do | 3 | Pittston Twp | do | Erie R. R. | Moosic | Hillside Coal and Iron Co. | Do. |
| 103 | Clear Spring | do | 3 | West Pittston | do | D., L. and W. R. R. | West Pittston | Clear Spring Coal Co | Pittston. |

*Directory af anthracite coal mines in Pennsylrania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| | Louise | Pittston | 3 | West Pittston | Luzerne | L. V. R. R. | West Pittston | Raub Coal Co | Luzerne. |
| 94 | Elmwood | do | 3 | Pittston Twp | do | do | Avoca | Florence Coal Co., Limited | Dupont. |
| 113 | Ridgewood | do | 3 | Plains Twp | do | N. Y., S. and W. R. R. | Mill Creek | Keystone Coal Co | Wilkesbarre. |
| 104 | Stevens | do | 3 | Exeter Twp | do | L. V. R. R. | Exeter | Stevens Coal Co | Scranton. |
| 107 | Mount Lookout | do | 3 | do | do | D., L. and W. R. R. and L. V. R. R. | do | Mount Lookout Coal Co | Do. |
| | Morning Star | do | 3 | do | do | L. V. R. R. | Wyoming | J. A. Hutchins | Wyoming. |
| 105 | Exeter | do | 3 | do | do | do | West Pittston | Lehigh Valley Coal Co | Wilkesbarre. |
| 92 | Heidelberg No. 1 | do | 3 | Pittston Twp | do | do | do | do | Do. |
| 93 | Heidelberg No. 2 | do | 3 | do | do | do | do | do | Do. |
| 133 | Diamond No. 1 | Wilkesbarre | 4 | Wilkesbarre | do | C. R. R. of New Jersey | Ashley | L. and W. Coal Co | Do. |
| 132 | Hollenback No. 2 | do | 4 | do | do | do | Wilkesbarre | do | Do. |
| 134 | Empire No. 4 | do | 4 | do | do | do | Ashley | do | Do. |
| 137 | S. Wilkesbarre No. 5. | do | 4 | do | do | do | S. Wilkesbarre | do | Do. |
| 135 | Stanton No. 7 | do | 4 | do | do | do | Ashley | do | Do. |
| 138 | New Jersey No. 8 | do | 4 | Hanover Twp | do | do | do | do | Do. |
| 139 | Sugar Notch No. 9 | do | 4 | do | do | do | Sugar Notch | do | Do. |
| | Maxwell No. 20 | do | 4 | do | do | do | do | do | Do. |
| 143 | Wanamie No. 18 | do | 4 | Newport Twp | do | do | Wanamie | do | Do. |
| 142 | Alden | do | 4 | do | do | do | Alden | Alden Coal Co | Alden. |
| 148 | Melville | do | 4 | do | do | do | Lee | Melville Coal Co | Wilkesbarre. |
| 130 | Red Ash No. 1 | do | 4 | Wilkesbarre Twp | do | do | Ashley | Red Ash Coal Co | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 131 | Red Ash No. 2 | Wilkesbarre | 4 | Wilkesbarre Twp | Luzerne | C. R. R. of New Jersey | Ashley | Red Ash Coal Co | Wilkesbarre. |
| 144 | Colliery No. 1 | do | 4 | Hanover Twp | do | P. R. R. | Nanticoke | Susquehanna Coal Co | Do. |
| 145 | Colliery No. 2 | do | 4 | do | do | P. R. R. | Nanticoke | Susquehanna Coal Co | Wilkesbarre. |
| 146 | Colliery No. 5 | do | 4 | do | do | do | do | do | Do. |
| 147 | Colliery No. 6 | do | 4 | Newport Twp | do | do | Glen Lyon | do | Do. |
| | Wyoming | do | 4 | Hanover Twp | do | C. R. R. of New Jersey | Sugar Notch | Wyoming Coal Co | Sugar Notch. |
| 117 | Bennett | do | 3 | Plains Twp. | do | do | Mill Creek | Thomas Waddell, est. of | Pittston. |
| 141 | Warrior Run | do | 4 | Hanover Twp | do | L. V. R. R. | Warrior Run | A. J. Davis & Co | Wilkesbarre. |
| 149 | West End No. 1 | do | 4 | Conyngham Twp | do | P. R. R. | Mocanaqua | West End Coal Co | Shickshinny. |
| 140 | Hadleigh | do | 4 | Hanover Twp | do | C. R. R. of New Jersey. | Sugar Notch | Crescent Coal Co | Wilkesbarre. |
| 129 | Hillman Vein | do | 4 | Wilkesbarre Twp | do | do | Wilkesbarre | Hillman Vein Coal Co | Do. |
| 136 | Franklin | do | 4 | do | do | do | Ashley | Lehigh Valley Coal Co | Do. |
| 120 | Henry | do | 3 | Plains Twp. | do | do | Port Bowkley | do | Do. |
| 122 | Prospect | do | 3 | do | do | do | do | do | Do. |
| 123 | Dorrance | do | 4 | Wilkesbarre Twp | do | do | do | do | Do. |
| 121 | Wyoming | do | 3 | Plains Twp. | do | do | do | do | Do. |
| 116 | Algonquin | do | 3 | do | do | N. Y., S. and W. R. R. | Miners Mills | Algonquin Coal Co | Do. |
| 125 | Laurel Run | do | 3 | do | do | do | Parsons | Laurel Run Coal Co | Do. |
| 126 | Baltimore Slope | do | 4 | Wilkesbarre Twp | do | D. and H. C. Co. R. R. | do | D. and H. Canal Co | Providence. |
| | Bal. Red Ash No. 2 | do | 4 | do | do | do | do | do | Do. |
| 127 | Baltimore Tunnel | do | 4 | do | do | do | Wilkesbarre | do | Do. |
| 128 | Conyngham | do | 4 | do | do | do | do | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 114 | Delaware | Wilkesbarre | 3 | Plains Twp. | Luzerne | D. and H. C. Co. R. R. | Mill Creek | D. and H. Canal Co. | Providence. |
| 168 | Lance No. 11 | Plymouth | 4 | Plymouth | do | C. R. R. of New Jersey. | Plymouth | L. and W. Coal Co. | Do. |
| 169 | Nottingham No. 15 | do | 4 | do | do | do | do | do | Do. |
| | Reynolds | do | 4 | do | do | D., L. and W. R. R. | do | Reynolds & Moyer Coal Co. | Kingston. |
| | Chauncey | do | 4 | do | do | do | do | do | Do. |
| 170 | Reynolds No. 16 | do | 4 | do | do | C. R. R. of New Jersey. | do | L. and W. Coal Co. | Wilkesbarre. |
| 172 | Avondale | do | 4 | Plymouth Twp. | do | D., L. and W. R. R. | Avondale | D., L. and W. R. R. Co. | Scranton. |
| | Auchincloss | do | 4 | do | do | do | do | do | Do. |
| | Bliss | do | 4 | do | do | do | do | do | Do. |
| 160 | Woodward | do | 4 | do | do | do | Kingston | do | Do. |
| 166 | Dodson | do | 4 | do | do | do | Plymouth | Plymouth Coal Co. | Wilkesbarre. |
| 155 | East Boston | do | 3 | Kingston | do | D., L. and W. R. R., P. R. R., and L. V. R. R. | Kingston | W. G. Payne & Co. | Kingston. |
| 171 | Parrish | do | 4 | Plymouth | do | C. R. R. of New Jersey. | Plymouth | Parrish Coal Co. | Plymouth. |
| | Buttonwood | do | 4 | do | do | do | do | do | Do. |
| 173 | Colliery No. 3 | do | 4 | West Nanticoke | do | P. R. R. | West Nanticoke | Susquehanna Coal Co. | Wilkesbarre. |
| | Salem | do | 4 | Shickshinny | do | D., L. and W. R. R. | Shickshinny | Cadwallader Coal Co. | Shickshinny. |
| 161 | Boston | do | 4 | Plymouth Twp. | do | D. and H. C. Co. R. R. | Plymouth | D. and H. Canal Co. | Providence. |
| 162 | Plymouth No. 2 | do | 4 | do | do | do | do | do | Do. |
| 163 | Plymouth No. 3 | do | 4 | do | do | do | do | do | Do. |
| 164 | Plymouth No. 4 | do | 4 | do | do | do | do | do | Do. |
| 165 | Plymouth No. 5 | do | 4 | do | do | do | do | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

NORTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspection district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 170 | Pettebone | Kingston | 3 | Kingston | Luzerne | D., L. and W. R. R | Plymouth | D., L. and W. R. R. Co | Providence. |
| 156 | Kingston No. 1 | do | 3 | Kingston Twp | do | do | do | Kingston Coal Co | Kingston. |
| 158 | Kingston No. 2 | do | 3 | Plymouth | do | do | do | do | Do. |
| | Kingston No. 3 | do | 3 | do | do | do | do | do | Do. |
| 157 | Kingston No. 4 | do | 3 | Kingston Twp | do | do | do | do | Do. |
| 167 | Gaylord | do | 4 | Plymouth Twp | do | do | do | do | Do. |
| 152 | Harry E | do | 3 | Kingston Twp | do | do | Bennett | Simpson & Watkins | Wilkesbarre. |
| 151 | Forty Fort | do | 3 | do | do | D., L. and W. R. R. and L. V. R. R. | Maltby | do | Do. |
| 154 | Black Diamond | do | 3 | do | do | do | Kingston | Plymouth Coal Co | Do. |
| 153 | Mill Hollow | do | 3 | do | do | do | Bennett | Thomas Waddell, Est. of | Pittston. |
| 150 | Maltby | do | 3 | do | do | L. V. R. R. | Maltby | Lehigh Valley Coal Co | Wilkesbarre. |

EASTERN MIDDLE COAL FIELD.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 175 | Upper Lehigh No. 2. | Green Mountain. | 5 | Butler Twp | Luzerne | C. R. R. of New Jersey | Upper Lehigh | Upper Lehigh Coal Co | Upper Lehigh. |
| 176 | Upper Lehigh No. 4. | do | 5 | do | do | do | do | do | Do. |
| 191 | Milnesville | Black Creek | 5 | Hazle Twp | do | P. R. R. | Hazleton | A. S. Van Wickle & Co | Milnesville. |
| 188 | Lattimer No. 1 | do | 5 | do | do | L. V. R. R. and D. S. and S. R. R. | do | Calvin Pardee & Co | Lattimer Mines. |
| 189 | Lattimer No. 2 | | | | | | | | |
| 190 | Lattimer No. 3 | | | | | | | | |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

EASTERN MIDDLE COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 192 | Hollywood | Black Creek | 5 | Hazle Twp | Luzerne | L. V. R. R. | Hazleton | Calvin Pardee & Co | Lattimer Mines. |
| 177 | Sandy Run | do | 5 | Foster Twp | do | C. R. R. of New Jersey | Sandy Run | M. S. Kemmerer & Co | Sandy Run. |
| 178 | Highland No. 1 | do | 5 | do | do | L. V. R. R. | Highlands | G. B. Markle & Co | Jeddo. |
| 179 | Highland Nos. 2, 5 | do | 5 | do | do | do | do | do | Do. |
| 184 | Jeddo No. 3 | do | 5 | Hazle Twp | do | do | Jeddo | do | Do. |
| 185 | Jeddo No. 4 | do | 5 | do | do | do | do | do | Do. |
| 195 | Derringer | do | 5 | Black Creek Twp | do | D., S. and S. R. R. | Derringer | Cross Creek Coal Co | Drifton. |
| 180 | Drifton No 1 | do | 5 | Foster Twp | do | do | Drifton | do | Do. |
| 181 | Drifton No. 2 | do | 5 | do | do | do | do | do | Do. |
| | Drifton No. 3 | do | 5 | Hazle Twp | do | do | do | do | Do. |
| 183 | Eckley No. 5 | do | 5 | Foster Twp | do | do | Eckley | do | Do. |
| 182 | Eckley No. 10 | do | 5 | do | do | do | do | do | Do. |
| 196 | Gowen | do | 5 | Black Creek Twp | do | do | Gowen | do | Do. |
| 194 | Tomhicken | do | 5 | Sugar Loaf Twp | do | do | Tomhicken | do | Do. |
| | Oneida Nos. 1, 2, and 3. | do | 6 | North Union | Schuylkill | do | Oneida | do | Do. |
| 197 | Hazlebrook | Hazleton | 5 | Foster Twp | Luzerne | L. V. R. R. | Hazlebrook | J. S. Wentz & Co | Mauch Chunk. |
| 208 | Harwood | do | 5 | Hazle Twp | do | D., S. and S. R. R. | Hazleton | Calvin Pardee and Co | Lattimer Mines. |
| | Ebervale? | do | 5 | do | do | L. V. R. R. | Ebervale | New Ebervale Coal Co | Ebervale. |
| 198 | Stockton | do | 5 | do | do | D., S. and S. R. R. | Stockton | Cross Creek Coal Co | Drifton. |
| 207 | Cranberry | do | 5 | do | do | L. V. R. R. | Hazleton | A. Pardee & Co | Hazleton. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

EASTERN MIDDLE COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| | East Crystal Ridge. | Hazleton | 5 | Hazle Twp | Luzerne | L. V. R. R. | Hazleton | A. Pardee & Co | Hazleton. |
| 205 | Hazleton Nos. 1, 2. | do | 5 | Hazleton | do | do | do | Lehigh Valley Coal Co | Do. |
| 204 | Hazleton Nos. 3, 5. | do | 5 | do | do | do | do | do | Do. |
| 206 | Hazleton No. 6 | do | 5 | do | do | do | do | do | Do. |
| 217 | Beaver Brook | Beaver Meadow. | 5 | do | do | L. V. R. R. and C. R. R. of New Jersey. | Audenried | C. M. Dodson & Co | Audenried. |
| 211 | Beaver Meadow | do | 5 | Banks Twp | Carbon | D., S. and S. R. R. and L. V. R. R. | Beaver Meadow | Cross Creek Coal Co | Drifton. |
| 218 | Honeybrook No. 2. | do | 5 | do | do | C. R. R. of New Jersey. | Treskow | L. and W. Coal Co | Wilkesbarre. |
| 219 | Honeybrook No. 4. | do | 6 | Klein Twp | Schuylkill | do | Audenried | do | Do. |
| 220 | Honeybrook No. 5. | do | 6 | do | do | do | do | do | Do. |
| 221 | Silver Brook No. 1. | do | 6 | do | do | L. V. R. R | Silver Brook | Silver Brook Coal Co | Mauch Chunk. |
| | Silver Brook No. 2. | do | 6 | do | do | do | do | do | Do. |
| 212 | Coleraine | do | 5 | Banks Twp | Carbon | do | Beaver Meadow | A. S. Van Wickle & Co | Hazleton. |
| 210 | Evans | do | 5 | do | do | do | do | do | Do. |
| 216 | Spring Brook | do | 5 | do | do | do | Audenried | Lehigh Valley Coal Co | Wilkesbarre. |
| 213 | Spring Mount No. 1. | do | 5 | Jeanesville | do | do | Jeanesville | do | Do. |
| 214 | Spring Mount No. 4. | do | 5 | do | Luzerne | do | do | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

WESTERN MIDDLE COAL FIELD.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 235 | Ellangowan | East Mahanoy | 6 | Mahanoy Twp. | Schuylkill | P. and R. Rwy | St. Nicholas | P. and R. Coal and Iron Co. | Pottsville. |
| 230 | Elmwood | do | 6 | do | do | do | Mahanoy City | do | Do. |
| 236 | Knickerbocker | do | 6 | do | do | do | Yatesville | do | Do. |
| 229 | Mahanoy City | do | 6 | Mahanoy City | do | do | Mahanoy City | do | Do. |
| 228 | North Mahanoy | do | 6 | Mahanoy Twp. | do | do | do | do | Do. |
| 227 | Schuylkill | do | 6 | do | do | do | do | do | Do. |
| 233 | Suffolk | do | 6 | do | do | do | St. Nicholas | do | Do. |
| 232 | St. Nicholas | do | 6 | do | do | do | do | do | Do. |
| 231 | Tunnel Ridge | do | 6 | do | do | do | Mahanoy City | do | Do. |
| 330 | Middle Lehigh | do | 7 | do | do | L. V. R. R. | New Boston | Mill Creek Coal Co | New Boston. |
| 223 | Buck Mountain | do | 6 | do | do | do | Buck Mountain | do | Do. |
| 331 | Morea | do | 8 | do | do | P. R. R. and L. V. R. R. | Morea | Dodson Coal Co. | Morea Colliery. |
| 222 | Park No. 2 | do | 6 | do | do | L. V. R. R. | Park Place | Lentz, Lilly & Co. | Park Place. |
| 226 | Springdale | do | 6 | do | do | do | do | do | Do. |
| 224 | Primrose | do | 6 | do | do | do | Mahanoy City | Lehigh Valley Coal Co. | Wilkesbarre. |
| 234 | Maple Hill | do | 6 | do | do | P. and R. Rwy | St. Nicholas | P. and R. Coal and Iron Co. | Pottsville. |
| 284 | Alaska | West Mahanoy | 7 | Mount Carmel Twp. | Northum'l'd | do | Alaska | do | Do. |
| 283 | Locust Gap | do | 7 | do | do | do | Locust Gap | do | Do. |
| 282 | Locust Spring | do | 7 | do | do | do | do | do | Do. |
| 279 | Merriam | do | 7 | do | do | do | Locust Summit | do | Do. |
| 280 | Monitor | do | 7 | do | do | do | Locust Gap | do | Do. |
| 281 | Reliance | do | 7 | do | do | do | Mount Carmel | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

WESTERN MIDDLE COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 276 | Mount Carmel.... | West Mahanoy | 7 | Mount Carmel Twp. | Northum'l'd.. | P. and R. Rwy., N. C. R. R., and L. V. R. R. | Mount Carmel.. | Thomas M. Righter & Co.. | Pottsville. |
| 274 | Columbus No. 1... | .....do ..... | 7 | N. Conyngham Twp | Columbia..... | L. V. R. R..... | .....do ..... | Lehigh Valley Coal Co..... | Wilkesbarre. |
| 271 | Centralia ..... | .....do ..... | 7 | .....do ..... | .....do ..... | .....do ..... | Centralia ..... | .....do ..... | Do. |
| 272 | Logan ..... | .....do ..... | 7 | .....do ..... | .....do ..... | .....do ..... | .....do ..... | .....do ..... | Do. |
| 268 | North Ashland ... | .....do ..... | 7 | .....do ..... | .....do ..... | P. and R. Rwy..... | Continental..... | P. and R. Coal and Iron Co. | Pottsville. |
| 278 | Potts ..... | .....do ..... | 7 | .....do ..... | .....do ..... | .....do ..... | Locust Dale..... | .....do ..... | Do. |
| | Scotch Valley..... | Black Creek .. | 7 | Beaver..... | ....do ..... | P. R. R..... | Scotch Valley.... | Scotch Valley C. Co..... | Glen City. |
| 267 | Bast ..... | West Mahanoy | 7 | Butler Twp..... | Schuylkill.... | P. and R. Rwy ..... | Ashland..... | P. and R. Coal and Iron Co. | Pottsville. |
| 247 | Bear Ridge..... | .....do ..... | 6 | West Mahanoy Twp. | .....do ..... | .....do ..... | Mahanoy Plane.. | .....do ..... | Do. |
| 238 | Boston Run..... | .....do ..... | 6 | Mahanoy Twp..... | .....do ..... | .....do ..... | St. Nicholas..... | .....do ..... | Do. |
| 237 | Bear Run ..... | .....do ..... | 6 | .....do ..... | .....do ..... | .....do ..... | .....do ..... | .....do ..... | Do. |
| 241 | Gilberton..... | .....do ..... | 6 | West Mahanoy Twp. | .....do ..... | .....do ..... | Gilberton ..... | .....do ..... | Do. |
| 260 | Girard Mammoth. | .....do ..... | 6 | .....do ..... | .....do ..... | .....do ..... | Raven Run ..... | .....do ..... | Do. |
| 263 | Girard ..... | .....do ..... | 6 | Butler Twp..... | .....do ..... | .....do ..... | Girardville ..... | .....do ..... | Do. |
| 262 | Hammond ..... | .....do ..... | 6 | .....do ..... | .....do ..... | .....do ..... | Conner ..... | .....do ..... | Do. |
| 248 | Indian Ridge ..... | .....do ..... | 6 | West Mahanoy Twp. | .....do ..... | .....do ..... | Shenandoah ..... | .....do ..... | Do. |
| 252 | Kohinoor ..... | .....do ..... | 6 | .....do ..... | .....do ..... | .....do ..... | .....do ..... | .....do ..... | Do. |
| 277 | Keystone ..... | .....do ..... | 7 | Butler Twp..... | .....do ..... | .....do ..... | Locust Dale ..... | .....do ..... | Do. |
| 249 | Shenandoah City.. | .....do ..... | 6 | West Mahanoy Twp. | .....do ..... | .....do ..... | Shenandoah ..... | .....do ..... | Do. |
| 266 | Tunnel ..... | .....do ..... | 6 | Butler Twp..... | .....do ..... | .....do ..... | Ashland..... | .....do ..... | Do. |
| 250 | Turkey Run ..... | .....do ..... | 6 | West Mahanoy Twp. | .....do ..... | .....do ..... | Shenandoah ..... | .....do ..... | Do. |
| 251 | West Shenandoah | .....do ..... | 6 | .....do ..... | .....do ..... | .....do ..... | .....do ..... | .....do ..... | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

WESTERN MIDDLE COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 265 | Preston No. 3 | West Mahanoy | 7 | Butler Twp. | Schuylkill | P. and R. Rwy | Girardville | P. and R. Coal and Iron Co. | Pottsville. |
| 269 | Big Mine Run | do | 7 | do | do | do | Ashland | Lehigh Valley Coal Co | Wilkesbarre. |
| 253 | Cambridge | do | 6 | West Mahanoy Twp. | do | do | Shenandoah | Cambridge Coal Co | Shenandoah. |
| 242 | Draper | do | 6 | do | do | do | Gilberton | P. and R. Coal and Iron Co. | Pottsville. |
| 239 | Furnace | do | 6 | do | do | do | do | Furnace Coal Co | Gilberton. |
| 254 | Kehley Run | do | 6 | do | do | do | Shenandoah | Thomas Coal Co | Philadelphia. |
| 245 | Lawrence | do | 6 | do | do | do | Mahanoy Plane | Lawrence Coal Co | Pottsville. |
| 255 | William Penn | do | 6 | do | do | P. R. R. | Shaft | William Penn Coal Co | Shaft. |
| 258 | Packer No. 2 | do | 6 | do | do | L. V. R. R. | Lost Creek | Lehigh Valley Coal Co | Wilkesbarre. |
| 256 | Packer No. 3 | do | 6 | do | do | do | Shenandoah | do | Do. |
| 257 | Packer No. 4 | do | 6 | do | do | do | do | do | Do. |
| 259 | Packer No. 5 | do | 6 | Butler Twp. | do | do | Girardville | do | Do. |
| 305 | Bear Valley | Shamokin | 7 | Coal Twp. | Northum'l'd | P. and R. Rwy | Shamokin | P. and R. Coal and Iron Co. | Pottsville. |
| 293 | Buck Ridge | do | 7 | do | do | do | Greenback | do | Do. |
| 304 | Burnside | do | 7 | do | do | do | Shamokin | do | Do. |
| 299 | Henry Clay | do | 7 | do | do | do | do | do | Do. |
| 306 | North Franklin | do | 7 | Zerbe Twp | do | do | Treverton | do | Do. |
| 297 | Cameron | do | 7 | Coal Twp. | do | N. C. Rwy | Shamokin | Mineral R. R. & Mining Co. | Wilkesbarre. |
| 296 | Luke Fidler | do | 7 | do | do | do | do | do | Do. |
| 290 | Hickory Ridge | do | 7 | do | do | do | Lancaster Switch | Union Coal Co | Shamokin. |
| 291 | Hickory Swamp | do | 7 | do | do | do | do | do | Do. |
| 286 | Pennsylvania | do | 7 | Mount Carmel Twp. | do | do | Mount Carmel | do | Do. |
| | Richards | do | 7 | do | do | do | do | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

WESTERN MIDDLE COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| 287 | Enterprise | Shamokin | 7 | Coal Twp. | Northum'l'd | P. and R. Rwy. | Excelsior | Enterprise Coal Co. | Excelsior. |
| 288 | Excelsior | do | 7 | do | do | do | do | Excelsior Coal Co. | Do. |
| 289 | Corbin | do | 7 | do | do | do | do | do | Do. |
| 292 | Colbert | do | 7 | do | do | N. C. Rwy. | Lancaster Switch | Shipman Coal Co. | Shamokin. |
| 302 | Neilson | do | 7 | do | do | P. & R. Rwy | Shamokin | J. Langdon & Co. | Elmira, N. Y. |
| | Natalie | do | 7 | do | do | P. and R. Rwy. | do | Natalie Anthracite Coal Co. | Mount Carmel. |
| | Royal Oak | do | 7 | do | Schuylkill | do | do | Royal Oak Coal Co. | Shamokin. |
| 275 | Midvalley | do | 7 | Mount Carmel Twp. | Northum'l'd | L. V. R. R. | Mount Carmel | Midvalley Coal Co. | Wilburton. |
| | Girard | do | 7 | do | do | P. R. R. | do | Girard Coal Co. | Mount Carmel. |

SOUTHERN COAL FIELD.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 307 | Colliery No. 1 | Panther Creek | 5 | Packer Twp. | Carbon | C. R. R. of New Jersey | Nesquehoning | Lehigh C. and N. Co | Lansford. |
| 308 | Colliery No. 4 | do | 5 | do | do | do | Lansford | do | Do. |
| 309 | Colliery No. 5 | do | 5 | do | do | do | do | do | Do. |
| | Colliery No. 6 | do | 5 | do | do | do | do | do | Do. |
| 311 | Colliery No. 8 | do | 8 | Rahn Twp. | Schuylkill | do | Coaldale | do | Do. |
| 310 | Colliery No. 9 | do | 5 | Packer Twp. | Carbon | do | do | do | Do. |
| 313 | Colliery No. 10 | do | 8 | Rahn Twp. | Schuylkill | do | Tamaqua | do | Do. |
| 314 | Colliery No. 11 | do | 8 | do | do | do | do | do | Do. |
| 312 | Colliery No. 12 | do | 8 | do | do | do | Coaldale | do | Do. |
| 315 | Colliery No. 13 | do | 8 | do | do | do | Tamaqua | do | Do. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

SOUTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| | Sharp Mountain .. | Panther Creek | 8 | Rahn Twp..... | Schuylkill.... | P. and R. Rwy ..... | Tamaqua ..... | Dunkelburger & Co ..... | Tamaqua. |
| | Marion ..... | E. Schuylkill . | 8 | East Norwegian Twp | .....do ..... | .....do ..... | St. Clair ..... | Marion Coal Co..... | St. Clair. |
| 324 | Eagle Hill ..... | .....do ..... | 8 | Blythe Twp ..... | .....do ..... | .....do ..... | Cumbola ..... | P. and R. Coal and Iron Co. | Pottsville. |
| 316 | East Lehigh ..... | .....do ..... | 8 | Tamaqua ..... | .....do ..... | .....do ..... | Tamaqua ..... | Mitchell & Shepp..... | Tamaqua. |
| 336 | Vulcan ..... | .....do ..... | 8 | Newcastle Twp ..... | .....do ..... | .....do ..... | St. Clair ..... | Mill Creek Coal Co ..... | New Boston. |
| 321 | Kaska William ... | .....do ..... | 8 | Blythe Twp ..... | .....do ..... | .....do ..... | Middleport ..... | T. M. Dodson Coal Co..... | S. Bethlehem. |
| | Palmer Vein..... | .....do ..... | 8 | .....do ..... | .....do ..... | .....do ..... | .....do ..... | Tyler & McTurk ..... | Philadelphia. |
| 325 | Pine Forest..... | .....do ..... | 8 | East Norwegian Twp | .....do ..... | .....do ..... | Mill Creek..... | P. and R. Coal and Iron Co. | Pottsville. |
| 322 | Silver Creek..... | .....do ..... | 8 | Blythe Twp ..... | .....do ..... | .....do ..... | Patterson..... | .....do ..... ..... | Do. |
| 326 | Mount Hope..... | .....do ..... | 8 | East Norwegian Twp | .....do ..... | .....do ..... | St. Clair ..... | G. B. Linderman & Co ..... | S. Bethlehem. |
| 338 | York Farm ..... | .....do ..... | 8 | .....do ..... | .....do ..... | ... .do ..... | .....do ..... | Lehigh Valley Coal Co..... | Wilkesbarre. |
| 344 | Glendower..... | W. Schuylkill. | 8 | Foster Twp ..... | .....do ..... | .....do ..... | Glen Carbon..... | P. and R. Coal and Iron Co. | Pottsville. |
| 350 | Otto ..... | .....do ..... | 8 | Reilly Twp..... | .....do ..... | .....do ..... | Branch Dale..... | .....do ..... | Do. |
| | St. Clair ..... | E. Schuylkill . | 8 | East Norwegian Twp | .....do ..... | .....do ..... | St. Clair ..... | St. Clair Coal Co..... | St. Clair. |
| | Little Diamond... | W. Schuylkill. | 8 | Cass Twp..... | .....do ..... | .....do ..... | Minersville..... | Little Diamond Coal Co.... | Schuylkill Haven. |
| 342 | Thomaston ..... | .....do ..... | 8 | .....do ..... | .....do ..... | .....do ..... ..... | Heckscherville .. | P. and R. Coal and Iron Co. | Pottsville. |
| 349 | Phœnix Park ..... | .....do ..... | 8 | .....do ..... | .....do ..... | .....do ..... | Llewellyn ..... | .....do ..... | Do. |
| 343 | Richardson ..... | .....do ..... | 8 | Foster Twp..... | .....do ..... | .....do . ..... | Glen Carbon..... | .....do ..... | Do. |
| 339 | Ellsworth ..... | .....do ..... | 8 | Newcastle Twp..... | .....do ..... | .....do ..... | Broad Mountain . | Davis Bros ..... | St. Clair. |
| | Herbine ..... | .....do ..... | 8 | Cass Twp..... | .....do ..... | .....do ..... | Minersville..... | Forestville Coal Co ..... | Forestville. |
| | Jugular..... | .....do ..... | 8 | Newcastle Twp..... | .....do ..... | .....do ..... | Broad Mountain . | Hefner & Whims ..... | Broad Mt. |
| | Albright..... | .....do ..... | 8 | Cass Twp..... | .....do ..... | .....do ..... | Llewellyn ..... | Albright Coal Co ..... | Pottsville. |

*Directory of anthracite coal mines in Pennsylvania*—Continued.

SOUTHERN COAL FIELD—Continued.

| Map No. | Name of mine. | Location. | | | | | | Operator. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Local district. | Inspectors' district. | Township, etc. | County. | Railroad. | Nearest shipping station. | Name. | Post-office address. |
| | Stoddart | W. Schuylkill | 6 | Cass Twp. | Schuylkill | P. and R. Rwy | Gilberton | Stoddart Coal Co | Gilberton. |
| | Wolf Creek | do | 8 | do | do | do | Minersville | do | Do. |
| | Rolfe | do | 8 | do | do | do | Llewellyn | Fernwood Coal Co | Minersville. |
| 345 | Oak Hill | do | 8 | do | do | do | Minersville | Leisenring & Co | Do. |
| | Pine Hill | do | 8 | do | do | do | do | Pine Hill Coal Co | Pottsville. |
| 352 | Blackwood | do | 8 | do | do | L. V. R. R. | Blackwood | Lehigh Valley Coal Co | Wilkesbarre. |
| 353 | Middle Creek | Lykens Valley | 8 | Frailey Twp. | do | P. and R. Rwy | Swatara Switch | P. and R. Coal and Iron Co. | Pottsville. |
| 359 | West Brookside | do | 8 | Porter Twp. | do | do | Brookside | do | Do. |
| 355 | Lincoln | do | 8 | Tremont Twp | do | do | Lorberry Junc | do | Do. |
| 358 | Good Spring | do | 8 | do | do | do | do | do | Do. |
| 360 | Williamstown | do | 7 | Wiconisco Twp. | Dauphin | N. C. Rwy | Williamstown | Summit Branch Railroad Co | Wilkesbarre. |
| 361 | Short Mountain | do | 7 | do | do | do | Lykens | Lykens Valley Coal Co | Do. |
| | Mountain | do | 8 | Cass Twp. | Schuylkill | P. and R. Rwy | Thomaston | Lamb, Davis & Co | Shenandoah. |
| | Lorberry | do | 8 | Tremont Twp | do | do | Tremont | Losch, Moore & Co | Tremont. |
| | Lytle | do | 8 | Cass Twp. | do | do | Minersville | Lytle Coal Co | Minersville. |
| | East Ridge | do | 8 | do | do | do | Heckscherville | East Ridge Coal Co | Do. |

*General offices of corporations named in foregoing directory.*

Pennsylvania Coal Company, No. 1 Broadway, New York.
Lehigh and Wilkesbarre Coal Company, No. 143 Liberty street, New York.
Delaware, Lackawanna and Western Railroad Company, No. 26 Exchange place, New York.
Delaware and Hudson Canal Company, No. 21 Cortlandt street, New York.
Coxe Brothers & Co., No. 143 Liberty street, New York.
Philadelphia and Reading Coal and Iron Company, Reading Terminal, Philadelphia.
Lehigh Valley Coal Company, No. 26 Cortlandt street, New York.
Lehigh Coal and Navigation Company, No. 108 South Fourth street, Philadelphia.
Hillside Coal and Iron Company, No. 21 Cortlandt street, New York.
New York, Susquehanna and Western Railroad Company, No. 26 Cortlandt street, New York.
Susquehanna Coal Company, Broad Street Station, Philadelphia.
Lykens Valley Coal Company, Broad Street Station, Philadelphia.
Mineral Railroad and Mining Company, Broad Street Station, Philadelphia.
Summit Branch Railroad Company, Broad Street Station, Philadelphia.
Union Coal Company, Erie, Pennsylvania.
New York, Ontario and Western Railway Company, 56 Beaver street, New York.
Delaware, Susquehanna and Schuylkill Railroad Company, 143 Liberty street, New York.

## PENNSYLVANIA BITUMINOUS COAL.

Total product in 1897, 54,597,891 short tons; spot value, $37,636,347.

Notwithstanding the miners' strike which partially paralyzed the coal-mining industry in the western counties of Pennsylvania in 1897, the total product for the State shows an increase of 5,040,438 short tons as compared with the output of 1896. The value of the product increased only $2,268,098, and the average price per ton declined from 71 cents to 69 cents. This was a slight decline in itself, but it is the continuation of a steadily declining tendency since 1891, when an average of 87 cents was realized. In six years the price has fallen 18 cents per ton, or nearly 21 per cent. The decline of 2 cents in 1897 means a difference of over $1,000,000 in the operators' receipts.

The miners' strike of 1897 was effective principally in the western counties of Pennsylvania. Allegheny County suffered most severely; 72 mines were affected, and 12,410 men on strike for an average of eighty-five days. The total average working time for this county fell from one hundred and eighty-eight days in 1896 to one hundred and sixty-four days in 1897 and the product declined 640,828 short tons. Washington County lost 177,315 short tons of product; 5,506 men were on strike an average of eighty-two days, and the average working time was curtailed from one hundred and eighty-five days in 1896 to one hundred and fifty-seven days in 1897. The product in Mercer County decreased 143,297 short tons; the average working time fell from two hundred and seventeen days to one hundred and sixty days, and 963 men were on strike sixty days.

The counties which seemed to secure benefit from the strike were Clearfield, whose product increased 667,030 tons; Cambria, 767,131

tons; Fayette, 1,625,491 tons, and Westmoreland, 1,364,736 tons. A large part of the increase in Fayette and Westmoreland counties, however, was due to the increased activity in the iron trade, creating an improved demand for Connellsville coke. The amount of coal made into coke at the mines in Fayette County increased from 5,434,716 tons in 1896 to 6,812,530 tons in 1897, so that not more than 150,000 tons could have gone to supply the demand created by the cutting off of the product of Allegheny County. Similarly about 650,000 tons of the increase in Westmoreland County consisted in the amount of coal made into coke at the mines, leaving an increase of about 700,000 tons in the coal marketed.

The time lost in the counties affected by the strike did not materially influence the total average working time for the State, which amounted to two hundred and five days in 1897 against two hundred and six days in 1896. Altogether there were 188 mines at which strikes occurred; 29,112 men were rendered nonsupporting for an average of seventy-two days, and the total time lost in the State by reason of the strikes was 2,102,336 working days. The statistics of the strikes in 1897 were as follows:

*Strikes in Pennsylvania bituminous coal mines in 1897.*

| County. | Number of mines where strikes occurred. | Number of men on strike. | Average number of days idle. | Total number of working days lost. |
|---|---|---|---|---|
| Allegheny | 72 | 12,410 | 85 | 1,052,386 |
| Armstrong | 4 | 347 | 53 | 18,250 |
| Beaver | 4 | 193 | 83 | 16,070 |
| Butler | 7 | 394 | 42 | 16,914 |
| Cambria | 10 | 1,647 | 29 | 47,244 |
| Clarion | 2 | 118 | 12 | 1,410 |
| Clinton | 1 | 140 | 50 | 770 |
| Clearfield | 1 | 795 | 21 | 16,695 |
| Fayette | 14 | 2,313 | 76 | 176,184 |
| Huntingdon | 6 | 175 | 50 | 8,794 |
| Indiana | 1 | 22 | 6 | 132 |
| Jefferson | 2 | 1,021 | 26 | 26,294 |
| Lawrence | 4 | 487 | 75 | 36,592 |
| Mercer | 9 | 963 | 60 | 57,475 |
| Somerset | 3 | 134 | 34 | 4,574 |
| Washington | 32 | 5,506 | 82 | 450,110 |
| Westmoreland | 16 | 2,447 | 70 | 172,442 |
| The State | 188 | 29,112 | 72 | 2,102,336 |

The number of firms using machines for mining and the number of mining machines in use both increased over 50 per cent in 1897, the former from 41 to 64, the latter from 454 to 690. The tonnage won by machines increased from 6,092,644 to 8,925,293, a gain of 2,832,649 tons, or about 46 per cent. The percentage of machine-mined coal to the total product in 1897 was 16.3 against 12.3 in 1896.

PRODUCTION BY COUNTIES.

There are two bituminous coal-producing counties, the product of each of which approached a total of 10,000,000 tons in 1897. These are Westmoreland, with an output of 9,923,812 short tons, and Fayette, with a product of 9,701,691 short tons. The exceptional activity in the iron trade during the year created a large demand for Connellsville coke, and these two counties furnish the supply. Fayette County increased its output 1,625,491 tons, of which increase 1,375,000 was in the amount of coal made into coke at the mines. Westmoreland County increased its output 1,364,736 tons, of which 650,000 went into coke. Allegheny County lost 640,828 tons on account of the strike, but retains third rank. Clearfield and Cambria County both had large gains in 1897, each falling but little short of 5,500,000 tons. Jefferson County, with an increase of 188,982 tons, yielded a total of 4,697,059 tons, while Washington County, another victim of the strike, lost 177,315 tons, the product amounting to 3,862,661 short tons in 1897. No other county had a product of 1,000,000 tons, although three—Elk, Somerset, and Tioga—each came within less than 8 per cent of reaching that figure, and Armstrong County, with a 40 per cent increase, reached 857,637 tons.

It may be noted that three different counties in Pennsylvania have an annual product of bituminous coal exceeding that of any other coal-producing State, except Illinois, West Virginia, and Ohio, and, if Alabama also be excepted, there are six counties which are entitled to that distinction.

In the following tables are shown the details of production by counties in 1896 and 1897, the total output of the State since 1873, and the production by counties each year since 1886, with the increase or decrease in each county during 1897 as compared with 1896:

*Bituminous coal product of Pennsylvania in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Allegheny.. | 82 | 7,521,145 | 255,068 | 71,129 | 9,525 | 7,856,867 | $5,504,199 | $0.70 | 188 | 13,733 |
| Armstrong . | 13 | 596,288 | 12,925 | 5,719 | ..... | 614,932 | 446,643 | .73 | 185 | 1,116 |
| Beaver ..... | 7 | 118,067 | 9,183 | 40 | ..... | 127,290 | 109,516 | .86 | 157 | 288 |
| Bedford .... | 12 | 152,804 | 24,209 | 1,772 | 58,629 | 237,414 | 171,218 | .72 | 135 | 709 |
| Blair ..... | 4 | 319,274 | 14,746 | 3,867 | 23,100 | 360,987 | 252,867 | .70 | 257 | 644 |
| Butler..... | 11 | 214,931 | 13,911 | 1,494 | ..... | 230,336 | 163,328 | .71 | 200 | 477 |
| Cambria.... | 68 | 4,171,254 | 193,609 | 38,450 | 246,506 | 4,649,819 | 3,747,177 | .81 | 213 | 7,345 |
| Center..... | 10 | 251,028 | 404 | 233 | ..... | 251,665 | 178,871 | .71 | 201 | 476 |
| Clarion ..... | 16 | 357,558 | 12,847 | 1,344 | ..... | 371,749 | 235,380 | .63 | 202 | 718 |
| Clearfield... | 91 | 4,581,983 | 26,495 | 25,924 | 177,615 | 4,812,017 | 3,207,510 | .66 | 190 | 8,681 |
| Elk..... | 6 | 800,704 | 3,909 | 3,273 | ..... | 807,886 | 607,509 | .75 | 229 | 1,441 |
| Fayette..... | 55 | 2,439,550 | 68,459 | 133,475 | 5,434,716 | 8,076,200 | 5,394,481 | .67 | 221 | 8,481 |
| Huntingdon | 12 | 323,903 | 9,698 | 5,996 | ..... | 339,597 | 236,134 | .69 | 197 | 678 |
| Indiana..... | 13 | 382,300 | 1,570 | 680 | 34,092 | 418,642 | 285,906 | .68 | 173 | 836 |
| Jefferson ... | 15 | 3,783,065 | 19,508 | 16,889 | 688,615 | 4,508,077 | 2,683,519 | .60 | 230 | 4,859 |
| Lawrence... | 5 | 173,072 | 25,256 | 338 | ..... | 198,666 | 167,298 | .84 | 208 | 409 |
| Lycoming .. | 2 | 79,730 | 4,000 | 500 | ..... | 83,230 | 101,680 | 1.22 | 236 | 168 |
| Mercer ..... | 11 | 547,729 | 17,444 | 13,896 | ..... | 579,069 | 421,496 | .73 | 217 | 1,158 |
| Somerset ... | 19 | 766,676 | 4,876 | 1,868 | 13,630 | 787,050 | 486,362 | .62 | 222 | 908 |
| Tioga..... | 8 | 806,352 | 12,756 | 5,547 | 1,032 | 825,687 | 950,099 | 1.15 | 203 | 1,910 |
| Washington | 43 | 3,826,217 | 188,010 | 25,749 | ..... | 4,039,976 | 2,383,177 | .59 | 185 | 6,506 |
| Westmoreland ..... | 63 | 5,272,408 | 41,874 | 145,741 | 3,099,053 | 8,559,076 | 6,810,995 | .80 | 224 | 10,719 |
| Bradford ... Clinton . ... McKean .... | 3 | 211,517 | 9,404 | 300 | ..... | 221,221 | 222,784 | 1.01 | 239 | 365 |
| Small mines. | ..... | ..... | 600,000 | ..... | ..... | 600,000 | 600,000 | ..... | ..... | ..... |
| Total.... | 569 | 37,696,555 | 1,570,161 | 504,224 | 9,786,513 | 49,557,453 | 35,368,249 | .71 | 206 | 72,625 |

*Bituminous coal product of Pennsylvania in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Allegheny | 83 | 6,818,256 | 322,818 | 62,756 | 12,209 | 7,216,039 | $4,848,096 | $0.67 | 164 | 14,039 |
| Armstrong | 13 | 853,945 | 666 | 3,026 | ..... | 857,637 | 601,561 | .70 | 245 | 1,340 |
| Beaver | 6 | 92,619 | 6,340 | 587 | ..... | 99,546 | 93,813 | .94 | 191 | 242 |
| Bedford | 11 | 399,023 | 94,487 | 5,056 | 38,053 | 436,619 | 290,269 | .66 | 206 | 862 |
| Blair | 5 | 409,965 | 3,305 | 6,602 | 73,103 | 492,975 | 345,023 | .70 | 242 | 761 |
| Butler | 11 | 228,969 | 2,940 | 1,780 | ..... | 233,689 | 146,610 | .63 | 162 | 565 |
| Cambria | 69 | 4,929,522 | 182,665 | 42,283 | 262,480 | 5,416,950 | 3,582,044 | .66 | 225 | 7,997 |
| Center | 13 | 510,791 | 9,948 | 361 | ..... | 521,100 | 315,690 | .61 | 218 | 734 |
| Clarion | 12 | 246,908 | 734 | 197 | ..... | 247,839 | 164,692 | .66 | 180 | 606 |
| Clearfield | 88 | 5,140,873 | 42,376 | 36,280 | 259,518 | 5,479,047 | 3,430,258 | .63 | 217 | 8,505 |
| Elk | 7 | 961,629 | 3,756 | 4,118 | ..... | 969,503 | 685,132 | .70 | 249 | 1,574 |
| Fayette | 57 | 2,576,161 | 174,503 | 138,497 | 6,812,530 | 9,701,691 | 5,797,323 | .60 | 224 | 9,097 |
| Huntingdon | 8 | 290,009 | 7,593 | 6,337 | ..... | 303,939 | 209,381 | .69 | 157 | 605 |
| Indiana | 11 | 513,565 | 3,597 | 310 | 24,495 | 541,967 | 371,448 | .69 | 195 | 623 |
| Jefferson | 15 | 3,938,364 | 5,207 | 31,510 | 721,978 | 4,697,059 | 2,892,309 | .62 | 240 | 5,321 |
| Lawrence | 5 | 194,386 | 446 | 454 | ..... | 195,286 | 180,925 | .93 | 199 | 560 |
| Mercer | 10 | 408,613 | 7,349 | 19,810 | ..... | 435,772 | 317,964 | .73 | 160 | 1,033 |
| Somerset | 24 | 892,161 | 13,118 | 2,292 | 17,036 | 924,607 | 572,163 | .62 | 226 | 1,234 |
| Tioga | 9 | 914,040 | 17,389 | 5,283 | 1,341 | 93-,053 | 1,118,451 | 1.19 | 203 | 2,069 |
| Washington | 40 | 3,807,605 | 26,491 | 28,565 | ..... | 3,862,661 | 2,127,939 | .55 | 157 | 6,624 |
| Westmoreland | 73 | 5,900,618 | 119,612 | 157,933 | 3,745,649 | 9,923,812 | 8,413,966 | .85 | 220 | 12,295 |
| Bradford, Clinton | 2 | 198,048 | 611 | 262 | ..... | 198,921 | 215,556 | 1.08 | 235 | 326 |
| Lycoming, McKean, Sullivan | 3 | 293,776 | 7,098 | 2,305 | ..... | 303,179 | 315,784 | 1.55 | 226 | 587 |
| Small mines | ..... | ..... | 600,000 | ..... | ..... | 600,000 | 600,000 | ..... | ..... | ..... |
| Total | 575 | 40,419,846 | 1,653,049 | 556,604 | 11,968,392 | 54,597,891 | 37,636,347 | .69 | 205 | 77,599 |

The following table shows the total product since 1873:

*Product of bituminous coal in Pennsylvania since 1873.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1873 | 13,098,829 | 1886 | 27,094,501 |
| 1874 | 12,320,000 | 1887 | 31,516,856 |
| 1875 | 11,760,000 | 1888 | 33,796,727 |
| 1876 | 12,880,000 | 1889 | 36,174,089 |
| 1877 | 14,000,000 | 1890 | 42,302,173 |
| 1878 | 15,120,000 | 1891 | 42,788,490 |
| 1879 | 16,240,000 | 1892 | 46,694,576 |
| 1880 | 21,280,000 | 1893 | 44,070,724 |
| 1881 | 22,400,000 | 1894 | 39,912,463 |
| 1882 | 24,640,000 | 1895 | 50,217,228 |
| 1883 | 26,880,000 | 1896 | 49,557,453 |
| 1884 | 28,000,000 | 1897 | 54,597,891 |
| 1885 | 26,000,000 | | |

The production by counties was not ascertained accurately prior to 1886. The results obtained by the bureau of industrial statistics of the State for 1882, 1884, and 1885 were published in the earlier volumes of Mineral Resources, but owing to the failure of a number of mines to report their production the statistics were incomplete, the total for 1885, for instance, being more than 5,000,000 tons short of the actual product. Since 1886 the product by counties has been as follows:

*Bituminous coal product of Pennsylvania since 1886, by counties.*

[Short tons.]

| County. | 1886. | 1887. | 1888. | 1889. |
|---|---|---|---|---|
| Allegheny | 4,202,086 | 4,680,924 | 5,575,505 | 4,717,431 |
| Armstrong | 210,856 | 235,221 | 226,093 | 289,218 |
| Beaver | 208,820 | 197,863 | 63,900 | 93,461 |
| Bedford | 173,372 | 311,452 | 248,159 | 257,455 |
| Blair | 305,695 | 287,367 | 314,013 | 215,410 |
| Bradford | 206,998 | 167,416 | 163,851 | 129,141 |
| Butler | 162,306 | 161,764 | 194,715 | 288,591 |
| Cambria | 1,222,028 | 1,421,980 | 1,540,460 | 1,751,664 |
| Cameron | 3,200 | 3,000 | 700 | 2,300 |
| Center | 313,383 | 508,255 | 382,770 | 395,127 |
| Clarion | 429,544 | 593,758 | 535,192 | 596,589 |
| Clearfield | 3,753,986 | 5,180,311 | 5,398,981 | 5,224,506 |
| Clinton | ..... | ..... | 32,000 | 106,000 |
| Elk | 526,036 | 609,757 | 555,960 | 614,113 |
| Fayette | 4,494,613 | 4,540,322 | 5,208,993 | 5,897,254 |
| Greene | 5,600 | 3,002 | 5,323 | 53,714 |
| Huntingdon | 313,581 | 265,479 | 281,823 | 280,133 |
| Indiana | 103,615 | 207,597 | 157,285 | 153,698 |
| Jefferson | 1,023,186 | 1,693,492 | 2,275,349 | 2,896,487 |
| Lawrence | 101,154 | 125,361 | 106,921 | 143,410 |
| McKean | 617 | 9,214 | 10,443 | 11,500 |
| Mercer | 537,712 | 539,721 | 487,122 | 575,751 |
| Somerset | 349,926 | 416,240 | 370,228 | 442,027 |
| Tioga | 1,384,800 | 1,328,963 | 1,106,146 | 1,036,175 |
| Venango | 2,500 | 2,296 | 2,000 | 6,911 |
| Washington | 1,612,407 | 1,751,615 | 1,793,022 | 2,364,901 |
| Westmoreland | 5,446,480 | 6,074,486 | 6,519,773 | 7,631,124 |
| Small mines | ..... | 200,000 | 240,000 | (*a*) |
| Total | 27,094,501 | 31,516,856 | 33,796,727 | 36,174,089 |
| Net increase | ..... | 4,422,355 | 2,279,871 | 2,377,362 |

*a* Included in county distribution.

*Bituminous coal product of Pennsylvania since 1886, by counties*—Continued.

[Short tons.]

| County. | 1890. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|---|
| Allegheny | 4,894,372 | 5,640,669 | 6,399,199 | 6,663,095 | 6,354,559 |
| Armstrong | 380,554 | 484,000 | 583,519 | 561,039 | 580,030 |
| Beaver | 139,117 | 129,961 | 140,835 | 150,095 | 103,765 |
| Bedford | 445,192 | 389,257 | 552,461 | 501,507 | 313,095 |
| Blair | 298,196 | 237,626 | 259,224 | 177,902 | 256,157 |
| Bradford | 126,687 | 68,697 | 57,708 | 42,739 | 28,027 |
| Butler | 167,578 | 211,647 | 145,729 | 156,016 | 137,593 |
| Cambria | 2,790,954 | 2,932,973 | 3,086,554 | 3,282,467 | 2,978,927 |
| Center | 452,114 | 526,753 | 496,521 | 458,056 | 307,806 |
| Clarion | 512,387 | 479,887 | 569,333 | 551,158 | 401,004 |
| Clearfield | 6,651,587 | 7,143,382 | 6,876,785 | 6,148,758 | 4,148,464 |
| Clinton | 159,000 | 130,802 | 98,242 | 94,582 | 100,000 |
| Elk | 1,121,534 | 973,600 | 731,575 | 634,165 | 399,023 |
| Fayette | 6,413,081 | 5,782,573 | 7,260,044 | 6,261,146 | 6,440,989 |
| Forest | ..... | ..... | ..... | ..... | 123 |
| Huntingdon | 322,630 | 269,021 | 333,855 | 303,547 | 200,032 |
| Indiana | 357,580 | 456,077 | 514,463 | 380,666 | 398,548 |
| Jefferson | 2,850,799 | 3,160,614 | 3,706,329 | 3,885,196 | 3,248,154 |
| Lawrence | 140,528 | 164,669 | 216,561 | 196,736 | 132,422 |
| Lycoming | ..... | ..... | 20,515 | 53,192 | 80,160 |
| McKean | (*a*) | 15,345 | 21,282 | 19,169 | 19,844 |
| Mercer | 524,319 | 526,220 | 420,145 | 499,651 | 331,594 |
| Somerset | 522,796 | 480,194 | 509,610 | 532,688 | 418,195 |
| Tioga | 903,997 | 1,010,872 | 999,784 | 962,248 | 704,560 |
| Washington | 2,836,667 | 2,606,158 | 2,903,235 | 3,315,146 | 3,461,428 |
| Westmoreland | 8,290,504 | 7,967,493 | 8,791,068 | 7,439,760 | 7,767,964 |
| Small mines | 1,000,000 | 1,000,000 | 1,000,000 | 800,000 | 600,000 |
| Total | 42,302,173 | 42,788,490 | 46,694,576 | 44,070,724 | 39,912,463 |
| Net increase | 6,128,084 | 486,317 | 3,906,086 | *b*2,623,852 | *b*4,158,261 |

*a* Included in product of small mines. *b* Net decrease.

*Bituminous coal product of Pennsylvania since 1886, by counties*—Continued.

[Short tons.]

| County. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| Allegheny | 6,615,974 | 7,856,867 | 7,216,039 | ..... | 640,828 |
| Armstrong | 642,809 | 614,932 | 857,637 | 242,705 | ..... |
| Beaver | 184,096 | 127,290 | 99,546 | ..... | 27,744 |
| Bedford | 417,988 | 237,414 | 436,619 | 199,205 | ..... |
| Blair | 374,157 | 360,987 | 492,975 | 131,988 | ..... |
| Bradford | 52,711 | 53,519 | 41,588 | ..... | 11,931 |
| Butler | 233,104 | 230,336 | 233,689 | 3,353 | ..... |
| Cambria | 4,289,257 | 4,649,819 | 5,416,950 | 767,131 | ..... |
| Center | 273,647 | 251,665 | 521,100 | 269,435 | ..... |
| Clarion | 389,850 | 371,749 | 247,839 | ..... | 123,910 |
| Clearfield | 5,215,527 | 4,812,017 | 5,479,047 | 667,030 | ..... |
| Clinton | 95,291 | 134,569 | 157,333 | 22,764 | ..... |
| Elk | 642,143 | 807,886 | 969,503 | 161,617 | ..... |
| Fayette | 9,665,369 | 8,076,200 | 9,701,691 | 1,625,491 | ..... |
| Forest | ..... | ..... | ..... | ..... | ..... |
| Huntingdon | 327,770 | 339,597 | 303,939 | ..... | 35,658 |
| Indiana | 513,075 | 418,642 | 541,967 | 123,325 | ..... |
| Jefferson | 4,248,329 | 4,508,077 | 4,697,059 | 188,982 | ..... |
| Lawrence | 269,779 | 198,666 | 195,286 | ..... | 3,380 |
| Lycoming | 84,050 | 83,230 | 91,735 | 8,505 | ..... |
| McKean | 38,000 | 33,133 | 31,527 | ..... | 1,606 |
| Mercer | 535,042 | 579,069 | 435,772 | ..... | 143,297 |
| Somerset | 524,755 | 787,050 | 924,607 | 137,557 | ..... |
| Sullivan | ..... | ..... | 179,917 | 179,917 | ..... |
| Tioga | 801,091 | 825,687 | 938,053 | 112,366 | ..... |
| Washington | 3,577,260 | 4,039,976 | 3,862,661 | ..... | 177,315 |
| Westmoreland | 9,606,154 | 8,559,076 | 9,923,812 | 1,364,736 | ..... |
| Small mines | 600,000 | 600,000 | 600,000 | ..... | ..... |
| Total | 50,217,228 | 49,557,453 | 54,597,891 | 6,206,107 | 1,165,669 |
| Net increase | 10,304,765 | *a* 659,775 | 5,040,438 | 5,040,438 | ..... |

*a* Net decrease.

In the following tables will be found a statement of the average prices which obtained in the different counties since 1889, and the statistics of labor and working time since 1890:

*Average prices for Pennsylvania coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Allegheny | $0.85 | $0.93 | $1.03 | $0.91 | $0.82 | $0.88 | $0.74 | $0.70 | $0.67 |
| Armstrong | .73 | .72 | .76 | .76 | .76 | .72 | .70 | .73 | .70 |
| Beaver | 1.18 | 1.05 | 1.00 | 1.01 | .98 | .91 | .77 | .86 | .94 |
| Bedford | .80 | .80 | .86 | .82 | .74 | .69 | .63 | .72 | .66 |
| Blair | .98 | .81 | .87 | .85 | .77 | .75 | .71 | .70 | .70 |
| Bradford | 1.33 | 1.28 | 1.34 | 1.42 | 1.30 | 1.53 | 1.25 | 1.30 | 1.40 |
| Butler | .97 | .87 | .89 | .93 | .81 | .76 | .69 | .71 | .63 |
| Cambria | .77 | .83 | .80 | .82 | .79 | .73 | .67 | .81 | .66 |
| Center | .79 | .79 | .75 | .79 | .75 | .68 | .63 | .71 | .61 |
| Clarion | .72 | .75 | .75 | .75 | .72 | .70 | .65 | .63 | .66 |
| Clearfield | .84 | .85 | .84 | .81 | .80 | .72 | .67 | .66 | .63 |
| Clinton | ..... | .78 | 1.15 | 1.01 | .76 | .81½ | .75 | .88 | 1.00 |
| Elk | .81 | .84 | .83 | .83 | .79 | .86 | 1.14 | .75 | .70 |
| Fayette | .63 | .77 | .82 | .77 | .73 | .69 | .67 | .67 | .60 |
| Huntingdon | .75 | .77 | .78 | .75 | .75 | .74 | .76 | .69 | .69 |
| Indiana | .71 | .82 | .76 | .77 | .77 | .70 | .64 | .68 | .69 |
| Jefferson | .73 | .85 | .88 | .81 | .74 | .71 | .65 | .60 | .62 |
| Lawrence | 1.05 | 1.02 | 1.02 | 1.02 | 1.03 | .92 | .78 | .84 | .93 |
| Lycoming | ..... | ..... | ..... | 1.12 | 1.22 | 1.23 | 1.20 | 1.22 | 1.20 |
| McKean | ..... | ..... | 1.05 | 1.10 | 1.10 | .95 | .95 | 1.05 | 1.04 |
| Mercer | .89 | .85 | .90 | .88 | .89 | .82 | .74 | .73 | .73 |
| Somerset | .70 | .65 | .71 | .66 | .63 | .63 | .59 | .62 | .62 |
| Sullivan | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .96 |
| Tioga | 1.22 | 1.10 | 1.14 | 1.44 | 1.21 | 1.36 | 1.16 | 1.15 | 1.19 |
| Washington | .66 | .93 | .87 | .87 | .78 | .62 | .66 | .59 | .55 |
| Westmoreland | .74 | .80 | .87 | .81 | .82 | .77 | .77 | .80 | .85 |
| The State | .77 | .84 | .87 | .84 | .80 | .74 | .72 | .71 | .69 |

*Statistics of labor employed and working time at Pennsylvania coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Allegheny | 9,036 | 198 | 11,194 | 199 | 11,223 | 225 | 14,328 | 161 |
| Armstrong | 661 | 251 | 805 | 230 | 964 | 216 | 1,080 | 214 |
| Beaver | 205 | 251 | 228 | 201½ | 323 | 210 | 318 | 215 |
| Bedford | 662 | 288 | 605 | 230 | 975 | 265 | 806 | 185 |
| Blair | 595 | 284 | 503 | 249 | 848 | 203 | 632 | 166 |
| Bradford | 292 | 196 | 169 | 228 | 122 | 206 | 83 | 167 |
| Butler | 314 | 237 | 342 | 240 | 358 | 169 | 276 | 208 |
| Cambria | 4,140 | 361 | 4,284 | 258 | 4,913 | 228 | 6,073 | 199 |
| Center | 623 | 230 | 823 | 200 | 767 | 181 | 743 | 193 |
| Clarion | 938 | 237 | 895 | 221 | 985 | 235 | 1,224 | 231 |
| Clearfield | 9,324 | 336 | 10,067 | 227 | 10,225 | 212 | 10,455 | 186 |
| Clinton | 200 | 265 | 181 | 291 | 175 | 175 | 175 | 163 |
| Elk | 1,181 | 255 | 1,622 | 229 | 1,265 | 230 | 1,244 | 195 |
| Fayette | 6,503 | 247 | 7,545 | 216½ | 7,952 | 239 | 6,780 | 195 |
| Huntingdon | 611 | 237 | 595 | 246 | 560 | 244 | 487 | 182 |
| Indiana | 668 | 245 | 561 | 227 | 656 | 191 | 605 | 186 |
| Jefferson | 3,971 | 245 | 4,172 | 237 | 4,567 | 232 | 5,537 | 210 |
| Lawrence | 307 | 232 | 327 | 236 | 368 | 250 | 430 | 218 |
| Lycoming | ..... | ..... | ..... | ..... | 60 | 252 | 117 | 279 |
| McKean | ..... | ..... | 42 | 230 | 28 | 304 | 19 | 285 |
| Mercer | 1,023 | 231 | 972 | 241 | 876 | 181 | 981 | 187 |
| Somerset | 646 | 225 | 531 | 266 | 577 | 238 | 695 | 214 |
| Tioga | 2,019 | 192 | 1,980 | 241 | 2,249 | 223 | 2,425 | 214 |
| Washington | 4,644 | 227 | 4,135 | 222 | 4,895 | 202 | 6,058 | 184 |
| Westmoreland | 12,080 | 228 | 11,083 | 221 | 10,724 | 234 | 10,270 | 205 |
| The State | 61,333 | 232 | 63,661 | 223 | 66,655 | 223 | 71,931 | 190 |

the year by which 47,207 tons were extracted. Another company put in three machines in December, and a new mine starting the first of 1898 will be equipped with machines.

Although the general strike did not extend to Tennessee, the State had labor troubles of its own to contend with, as the following list will show.

*Strikes in Tennessee coal mines during 1897.*

| County and mine. | Number of men on strike. | Number of days idle. | Period. |
|---|---|---|---|
| ANDERSON COUNTY. | | | |
| Cross Mountain Mine | 150 | 45 | Nov. 15 to Dec. 31. |
| CAMPBELL COUNTY. | | | |
| Jellico B. G. Mine | 70 | 156 | May 1 to Nov. 1. |
| Indian Mountain Mine | 80 | 130 | May 1 to Oct. 1 |
| Price Mountain Mine | 25 | 30 | June 1 to July 1. |
| Standard Mine | 132 | 156 | May 1 to Nov. 1. |
| Falls Branch Mine | 120 | 156 | Do. |
| Wooldridge Mine | 200 | 156 | Do. |
| New Pioneer Mine | 100 | 30 | Jan. 1 to Feb. 1. |
| CLAIBORNE COUNTY. | | | |
| Mingo Mine | 247 | 25 | Sept. 18 to Oct. 13. |
| Bryson Mountain Mine | 40 | 22 | Sept. 20 to Oct. 12. |
| Fork Ridge Mine | 100 | 30 | Sept. 12 to Oct. 12. |
| GRUNDY COUNTY. | | | |
| Tracy City Mine | 579 | 26 | Jan. 1 to Feb. 1. |
| PUTNAM COUNTY. | | | |
| Monterey Mine | 30 | 20 | Aug. 20 to Sept. 10. |
| RHEA COUNTY. | | | |
| Richland Mine | 250 | 8 | Dec. 20 to 28. |
| SCOTT COUNTY. | | | |
| Paint Rock Mine | 155 | 170 | May 1 to Nov. 15. |
| Paving Brick Mine | 60 | 60 | Apr. 1 to June 1. |
| | | 100 | Aug. 3 to Dec. 1. |

The details of production during 1896 and 1897 are shown in the following tables:

*Coal product of Tennessee in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Anderson | 6 | 452,360 | 339 | 3,811 | ..... | 456,510 | $366,141 | $0.80 | 230 | 1,015 |
| Campbell | 12 | 360,838 | 15,414 | 585 | 7,500 | 384,337 | 374,911 | .98 | 164 | 1,718 |
| Claiborne | 4 | 153,477 | 200 | 1,850 | 48,399 | 203,926 | 161,104 | .79 | 220 | 368 |
| Hamilton | 3 | 96,689 | 2,205 | 1,384 | 63,532 | 163,810 | 139,067 | .85 | 183 | 517 |
| Marion | 3 | 187,940 | 2,572 | 936 | 103,447 | 294,895 | 261,895 | .89 | 223 | 628 |
| Morgan | 6 | 217,112 | 836 | ..... | ..... | 217,948 | 134,771 | .62 | 265 | 509 |
| Rhea | 2 | 4,946 | 839 | 4,780 | 81,050 | 91,615 | 59,549 | .65 | 186 | 270 |
| Scott | 4 | 154,715 | 12,295 | 2,288 | 19,178 | 188,476 | 180,480 | .96 | 178 | 453 |
| Cumberland, Grundy, Putnam | 3 | 218,393 | 220 | 15,608 | 107,447 | 341,668 | 324,416 | .95 | 271 | 496 |
| Roane, White | 2 | 144,068 | 4,332 | 9,101 | 157,920 | 315,421 | 274,461 | .87 | 263 | 557 |
| Small mines | ..... | ..... | 4,500 | ..... | ..... | 4,500 | 4,500 | ..... | ..... | ..... |
| Total | 45 | 1,990,538 | 43,752 | 40,343 | 588,473 | 2,663,106 | 2,281,295 | .86 | 211 | 6,531 |

*Coal product of Tennessee in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Anderson | 7 | 551,065 | 2,597 | 4,034 | ..... | 557,696 | $453,112 | $0.80 | 245 | 1,177 |
| Campbell | 11 | 303,010 | 10,369 | 3,115 | 12,000 | 328,494 | 306,481 | .93 | 142 | 1,108 |
| Claiborne | 4 | 229,189 | 1,200 | ..... | 40,538 | 270,927 | 199,559 | .74 | 219 | 544 |
| Hamilton | 2 | 139,967 | 1,381 | 1,630 | 68,981 | 211,959 | 167,243 | .79 | 253 | 477 |
| Marion | 3 | 201,775 | 2,363 | 977 | 107,126 | 312,241 | 281,300 | .90 | 252 | 543 |
| Morgan | 6 | 288,110 | 1,275 | 500 | 11,800 | 301,694 | 210,095 | .70 | 279 | 532 |
| Rhea | 3 | 9,149 | ..... | 9,747 | 120,176 | 139,072 | 97,349 | .70 | 266 | 325 |
| Scott | 4 | 66,385 | 8,834 | 1,800 | 11,293 | 88,312 | 80,311 | .91 | 121 | 425 |
| Grundy, Putnam | 3 | 194,398 | 988 | 4,323 | 129,031 | 328,740 | 226,994 | .69 | 229 | 611 |
| Roane, White | 2 | 167,122 | 4,113 | 13,149 | 160,830 | 345,214 | 302,590 | .88 | 256 | 595 |
| Small mines | ..... | ..... | 4,500 | ..... | ..... | 4,500 | 4,500 | ..... | ..... | ..... |
| Total | 45 | 2,150,179 | 37,620 | 39,275 | 661,775 | 2,888,849 | 2,329,534 | .81 | 221 | 6,337 |

*Statistics of labor employed and working time at Tennessee coal mines*—Continued.

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Anderson | 1,217 | 256 | 1,118 | 248 | 1,015 | 230 | 1,177 | 245 |
| Campbell | 698 | 140 | 1,128 | 174 | 1,718 | 164 | 1,108 | 142 |
| Claiborne | 277 | 169 | 284 | 179 | 368 | 220 | 544 | 219 |
| Grundy | 904 | 238 | 424 | 312 | 475 | 272 | 579 | 232 |
| Hamilton | 441 | 218 | 335 | 220 | 517 | 183 | 477 | 253 |
| Marion | 522 | 183 | 581 | 249 | 628 | 223 | 543 | 252 |
| Morgan | 373 | 145 | 209 | 134 | 509 | 265 | 532 | 279 |
| Putnam | ..... | ..... | ..... | ..... | 20 | 250 | 30 | 188 |
| Rhea | 209 | 253 | 165 | 240 | 270 | 186 | 325 | 266 |
| Roane | 210 | 307 | 200 | 225 | 200 | 286 | 220 | 286 |
| Scott | 366 | 194 | 331 | 193 | 453 | 178 | 425 | 121 |
| White | 300 | 196 | 325 | 283 | 357 | 250 | 375 | 238 |
| The State.. | 5,542 | 210 | 5,120 | 224 | 6,531 | 211 | 6,337 | 221 |

The annual output of the State since 1873 has been as follows:

*Coal product of Tennessee from 1873 to 1897.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1873 | 350,000 | 1886 | 1,714,290 |
| 1874 | 350,000 | 1887 | 1,900,000 |
| 1875 | 360,000 | 1888 | 1,967,297 |
| 1876 | 550,000 | 1889 | 1,925,689 |
| 1877 | 450,000 | 1890 | 2,169,585 |
| 1878 | 375,000 | 1891 | 2,413,678 |
| 1879 | 450,000 | 1892 | 2,092,064 |
| 1880 | 641,042 | 1893 | 1,902,258 |
| 1881 | 750,000 | 1894 | 2,180,879 |
| 1882 | 850,000 | 1895 | 2,535,644 |
| 1883 | 1,000,000 | 1896 | 2,663,106 |
| 1884 | 1,200,000 | 1897 | 2,888,849 |
| 1885 | 1,440,957 | | |

## TEXAS.

Total product in 1897, 639,341 short tons; spot value, $972,323.

Coal production in Texas has exhibited a regular increase each year since 1891. The output in 1897 was 95,326 short tons, or 17.5 per cent, larger than that of 1896; 154,382 short tons, or 32 per cent, more than that of 1895; three and three-fourths times the product in 1891, and more than five times the output of 1889. Much of the increase in the

last few years has been due to the development of the lignite fields in Medina, Milam, and Robertson counties. Work at Rockdale, Milam County, and at Calvert, in Robertson County, has been particularly active, the aggregate product of these two counties being over 160,000 tons in 1897. Lignite mines were opened in Burleson County during 1897, the initial product amounting to 5,100 tons. A small amount of lignite was produced in Shelby County, and the total lignite production in the State amounted to one-third the entire output. Bituminous coal is produced in Erath, Montague, Palo Pinto, Parker, Webb, and Wise counties, the total bituminous product in 1897 amounting to 422,727 short tons, as compared with 376,076 short tons in 1896, showing an increase in 1897 over the preceding year of 46,651 short tons. The increase in the production of lignite was 68,235 short tons.

There was only one mine at which any labor disturbance occurred in 1897. Ten men at the mines of the Aransas Pass Lignite Company, Milam County, were on a strike for four days. The striking miners were then discharged, and no further trouble occurred. Texas, notwithstanding the State's comparatively remote situation, has not escaped the effects of the tendency to lower prices. Since 1894, when the average price was $2.32 per ton, there has been a decline of 80 cents to $1.52 per ton in 1897, a loss of 34 per cent. Much of this decrease has been due not only to the increased production of lignite but also to a war of competition among the lignite producers, which has resulted in bringing prices much below what conservative operators would consider legitimate figures.

The following table shows the statistics of coal production in the State since 1889:

*Coal product of Texas since 1889.*

| Distribution. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Loaded at mines for shipment... | 120,602 | 180,800 | 169,300 | 241,005 |
| Sold to local trade and used by employes..... | 6,552 | 1,840 | 900 | 4,460 |
| Used at mines for steam and heat. | 1,062 | 1,800 | 1,900 | 225 |
| Total ..... | 128,216 | 184,440 | 172,100 | 245,690 |
| Total value..... | $340,617 | $465,900 | $412,300 | $569,333 |

| Distribution. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Loaded at mines for shipment. | 300,064 | 417,281 | 475,157 | 522,177 | 621,635 |
| Sold to local trade and used by employees..... | 462 | 2,412 | 7,705 | 12,846 | 8,357 |
| Used at mines for steam and heat ..... | 1,680 | 1,155 | 2,097 | 8,992 | 9,349 |
| Total ..... | 302,206 | 420,848 | 484,959 | 544,015 | 639,341 |
| Total value ..... | $688,407 | $976,458 | $913,138 | $896,251 | $972,323 |

The statistics of the production in 1896 and 1897 in somewhat greater detail are shown in the following tables:

*Coal product of Texas in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| Bituminous: | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Erath, Montague, Palo Pinto, Parker | 4 | 296,363 | 3,876 | 3,702 | 303,941 | $613,596 | $2.02 | 191 | 1,173 |
| Webb | 2 | 68,995 | ..... | 3,140 | 72,135 | 134,276 | 1.86 | 255 | 350 |
| Lignite: | | | | | | | | | |
| Bastrop, Medina, Milam, Robertson | 7 | 145,219 | 8,550 | 2,100 | 155,869 | 132,339 | .85 | 177 | 320 |
| Nacogdoches, Shelby | 3 | 11,600 | 420 | 50 | 12,070 | 16,040 | 1.33 | 58 | 110 |
| Total | 16 | 522,177 | 12,846 | 8,992 | 544,015 | 896,251 | 1.65 | 187 | 1,953 |

*Coal product of Texas in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| Bituminous: | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Erath, Montague, Palo Pinto, Parker, Wise | 5 | 339,999 | 847 | 2,034 | 342,880 | $658,824 | $1.92 | 201 | 1,053 |
| Webb | 2 | 79,847 | ..... | ..... | 79,847 | 134,014 | 1.68 | 300 | 325 |
| Lignite: | | | | | | | | | |
| Burleson, Medina, Milam, Robertson, Shelby | 9 | 201,789 | 7,510 | 7,315 | 216,614 | 179,485 | .83 | 204 | 388 |
| Total | 16 | 621,635 | 8,357 | 9,349 | 639,341 | 972,323 | 1.52 | 220 | 1,766 |

## UTAH.

Total product in 1897, 521,560 short tons; spot value, $618,230.

Utah's product of coal in 1897 was 102,933 short tons, or nearly 25 per cent larger than that of 1896, passing the half million ton mark for

the first time. The value increased in almost equal proportion to the tonnage, showing an actual gain of $117,683, and a percentage gain of 23.5. The average price per ton realized in 1897 was $1.19, against $1.20 in 1896. Prior to 1897 there had been a decided falling off in price each year since 1891. In that year $1.80 was obtained; in 1892 it dropped to $1.56; in 1893 it was $1.48; in 1894, $1.40; in 1895, $1.31, and in 1896, $1.20, a decline in five years of 33⅓ per cent.

The details of production in 1896 and 1897 are shown in the following tables:

*Coal product of Utah in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Carbon | 5 | 294,057 | 3,545 | 3,350 | 61,707 | 362,659 | $428,398 | $1.18 | 215 | 548 |
| Iron | 2 | ..... | 316 | 16 | ..... | 332 | 733 | 2.21 | 52 | 7 |
| Sanpete | 2 | 2,023 | ..... | 12 | ..... | 2,035 | 4,279 | 2.10 | 95 | 15 |
| Summit | 3 | 44,146 | 5,015 | 4,033 | ..... | 53,194 | 66,408 | 1.25 | 165 | 102 |
| Uinta<br>Utah | 3 | 112 | 295 | ..... | ..... | 407 | 729 | 1.79 | 77 | 7 |
| Total | 15 | 340,338 | 9,171 | 7,411 | 61,707 | 418,627 | 500,547 | 1.20 | 202 | 679 |

*Coal product of Utah in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Carbon | 4 | 396,523 | 2,033 | 5,400 | 64,925 | 468,881 | $549,109 | $1.17 | 211 | 588 |
| Summit | 4 | 28,247 | 17,594 | 3,795 | ..... | 49,636 | 63,114 | 1.27 | 171 | 104 |
| Iron<br>Sanpete<br>Uinta | 3 | ..... | 3,040 | 3 | ..... | 3,043 | 6,007 | 1.97 | 144 | 12 |
| Total | 11 | 424,770 | 22,667 | 9,198 | 64,925 | 521,560 | 618,230 | 1.19 | 204 | 704 |

For comparison with previous years, the following table showing the distribution and value of the production since 1891, together with the statistics of labor employed and average working time is given:

*Distribution of the coal product of Utah since 1891.*

| Year. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| 1891 | 315,711 | 8,233 | 21,650 | 25,451 | 371,045 | $666,646 | $1.80 | ..... | 621 |
| 1892 | 321,431 | 6,775 | 6,509 | 26,298 | 361,013 | 562,625 | 1.56 | 230 | 646 |
| 1893 | 350,423 | 7,649 | 4,258 | 50,875 | 413,205 | 611,092 | 1.48 | 226 | 576 |
| 1894 | 364,675 | 11,173 | 6,892 | 48,810 | 431,550 | 603,479 | 1.40 | 199 | 671 |
| 1895 | 376,479 | 25,097 | 7,253 | 63,027 | 471,836 | 617,349 | 1.31 | 203 | 670 |
| 1896 | 340,338 | 9,171 | 7,411 | 61,707 | 418,627 | 500,547 | 1.20 | 202 | 679 |
| 1897 | 424,770 | 22,667 | 9,198 | 64,925 | 521,560 | 618,230 | 1.19 | 204 | 704 |

There are no records of the amount of coal produced in Utah prior to 1885. Since that time the annual output has been as follows:

*Coal product of Utah since 1885.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1885 | 213,120 | 1892 | 361,013 |
| 1886 | 200,000 | 1893 | 413,205 |
| 1887 | 180,021 | 1894 | 431,550 |
| 1888 | 258,961 | 1895 | 471,836 |
| 1889 | 236,651 | 1896 | 418,627 |
| 1890 | 318,159 | 1897 | 521,560 |
| 1891 | 371,045 | | |

## VIRGINIA.

Total product in 1897, 1,528,302 short tons; spot value, $1,021,918.

Virginia profited by the miners' strikes in other States to the extent of increasing her coal production 273,579 short tons, or 22 per cent, over the product in 1896, and reaching the largest total in her history. All of the increased production was in the Clinch Valley field, in Wise County. The output in Tazewell County fell off 10 per cent, while that from the Richmond basin was about the same as in 1896. The product in Montgomery County, which is not large at any time, decreased about 45 per cent, while the output of Pulaski County was practically unchanged.

The only strikes which occurred in Virginia were two at the Toms Creek Coal Company's mines, in Wise County. The two strikes were each of fifteen days' duration, one from April 1 to April 15, the other from July 10 to July 25, 300 men being involved in each case.

The following tables exhibit the details of production in 1896 and 1897:

*Coal product of Virginia in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Montgomery. | 8 | 951 | 6,832 | 48 | ..... | 7,831 | $15,858 | $2.03 | 147 | 40 |
| Pulaski..... | 3 | 8,175 | 95 | ..... | ..... | 8,270 | 9,335 | 1.13 | 115 | 45 |
| Tazewell .... | 2 | 519,538 | 4,540 | 7,056 | 254,211 | 785,345 | 484,178 | .62 | 270 | 1,029 |
| Wise ..... | 13 | 229,825 | 29,186 | 2,988 | 95,608 | 357,607 | 217,519 | .61 | 186 | 595 |
| Chesterfield . Henrico..... | 3 | 65,553 | 298 | 28,448 | 1,371 | 95,670 | 121,961 | 1.27 | 121 | 801 |
| Total.... | 29 | 824,042 | 40,951 | 38,540 | 351,190 | 1,254,723 | 848,851 | .68 | 198 | 2,510 |

*Coal product of Virginia in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total Value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Chesterfield, Henrico, Montgomery, and Pulaski.... | 11 | 74,012 | 4,101 | 28,469 | 1,400 | 107,953 | $136,503 | $1.26 | 123 | 866 |
| Tazewell .... | 2 | 524,028 | 5,652 | 7,840 | 170,818 | 708,338 | 415,778 | .59 | 289 | 660 |
| Wise ..... | 8 | 371,933 | 19,264 | 6,778 | 314,007 | 712,011 | 469,637 | .66 | 249 | 818 |
| Total.. | 21 | 969,973 | 29,017 | 43,087 | 486,225 | 1,528,302 | 1,021,918 | .67 | 213 | 2,344 |

The total production of coal in Virginia since 1880 has been as follows:

*Coal product of Virginia since 1880.*

| Year. | Short tons. | Value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|
| 1880 | 112,000 | | | | |
| 1881 | 112,000 | | | | |
| 1882 | 112,000 | | | | |
| 1883 | 252,000 | | | | |
| 1884 | 336,000 | | | | |
| 1885 | 567,000 | | | | |
| 1886 | 684,951 | | | | |
| 1887 | 825,263 | | | | |
| 1888 | 1,073,000 | | | | |
| 1889 | 865,786 | | | | |
| 1890 | 784,011 | | | | |
| 1891 | 736,399 | $611,654 | $0.83 | 246 | 820 |
| 1892 | 675,205 | 578,429 | .86 | 192 | 836 |
| 1893 | 820,339 | 692,748 | .84 | 253 | 961 |
| 1894 | 1,229,083 | 933,576 | .76 | 234 | 1,635 |
| 1895 | 1,368,324 | 869,873 | .63 | 225 | 2,158 |
| 1896 | 1,254,723 | 848,851 | .68 | 198 | 2,510 |
| 1897 | 1,528,302 | 1,021,918 | .67 | 213 | 2,344 |

## WASHINGTON.

Total product in 1897, 1,434,112 short tons; spot value, $2,777,687.

The amount of coal produced in the State of Washington during 1897 exceeded that of any previous year, although there were three years—1888, 1890, and 1893—when the value of the product was greater than that of 1897. Compared with 1896, the product for 1897 shows an increase of 238,608 short tons, or 20 per cent in quantity, and of $381,609, or 16 per cent in value.

Washington coal mines were comparatively free from strikes in 1897, the only strike reported being at the Issaquah mines of the Seattle Coal and Iron Company, in King County, where 200 men were out for twenty-four days, from August 7 to August 31.

An interesting report on the coal fields of Puget Sound, by Mr. Bailey Willis, is contained in Part III of the Eighteeth Annual Report of the Survey.

The annual product since 1885 has been as follows:

*Product of coal in Washington since 1885.*

| Year. | Total product. | Total value. | Average price per ton. | Average number of employees. | Average number of days worked. |
|---|---|---|---|---|---|
| | *Short tons.* | | | | |
| 1885 | 380,250 | ..... | ..... | ..... | ..... |
| 1886 | 423,525 | $952,931 | $2.25 | ..... | ..... |
| 1887 | 772,601 | 1,699,746 | 2.19 | 1,571 | ..... |
| 1888 | 1,215,750 | 3,647,250 | 3.00 | ..... | ..... |
| 1889 | 1,030,578 | 2,393,238 | 2.32 | 2,657 | ..... |
| 1890 | 1,263,689 | 3,426,590 | 2.71 | 2,006 | 270 |
| 1891 | 1,056,249 | 2,437,270 | 2.31 | 2,447 | 211 |
| 1892 | 1,213,427 | 2,763,547 | 2.28 | 2,564 | 247 |
| 1893 | 1,264,877 | 2,920,876 | 2.31 | 2,757 | 241 |
| 1894 | 1,106,470 | 2,578,441 | 2.31 | 2,662 | 207 |
| 1895 | 1,191,410 | 2,577,958 | 2.16 | 2,840 | 224 |
| 1896 | 1,195,504 | 2,396,078 | 2.00 | 2,622 | 221 |
| 1897 | 1,434,112 | 2,777,687 | 1.94 | 2,739 | 236 |

The total output of the State since 1887, by counties, with the increases and decreases in 1897, as compared with 1896, is shown in the following table:

*Product of coal in Washington since 1887, by counties.*

[Short tons.]

| County. | 1887. | 1888. | 1889. | 1890. | 1891. | 1892. |
|---|---|---|---|---|---|---|
| King | 339,961 | 546,535 | 415,779 | 517,492 | 429,778 | 508,467 |
| Kittitas | 104,782 | 220,000 | 294,701 | 445,311 | 348,018 | 285,088 |
| Okanogan | ..... | ..... | ..... | ..... | ..... | ..... |
| Pierce | 229,785 | 276,956 | 273,618 | 285,886 | 271,053 | 364,294 |
| Skagit | ..... | ..... | ..... | ..... | 1,400 | 4,703 |
| Thurston | 15,295 | 42,000 | 46,480 | 15,000 | ..... | 22,119 |
| Whatcom | ..... | ..... | ..... | ..... | 6,000 | 28,756 |
| Not specified | 82,778 | 130,259 | ..... | ..... | ..... | ..... |
| Total | 772,601 | 1,215,750 | 1,030,578 | 1,263,689 | 1,056,249 | 1,213,427. |

| County. | 1893. | 1894. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|---|---|
| Cowlitz | ..... | ..... | ..... | 1,263 | 1,248 | ..... | 15 |
| King | 577,731 | 422,676 | 435,971 | 481,710 | 583,488 | 101,778 | ..... |
| Kittitas | 253,467 | 232,580 | 281,534 | 265,953 | 370,657 | 104,704 | ..... |
| Okanogan | ..... | 50 | ..... | ..... | ..... | ..... | ..... |
| Pierce | 408,074 | 406,831 | 437,029 | 419,568 | 458,394 | 38,826 | ..... |
| Skagit | 2,905 | 7,537 | 20,326 | 18,548 | 13,825 | ..... | 4,723 |
| Thurston | ..... | 26,880 | } 16,550 | ..... | } 6,500 | ..... | 1,962 |
| Whatcom | 22,700 | 9,916 | | 8,462 | | | |
| Total | 1,264,877 | 1,106,470 | 1,191,410 | 1,195,504 | 1,434,112 | a 238,608 | ..... |

a Net increase.

## WEST VIRGINIA.

Total product in 1897, 14,248,159 short tons; spot value, $8,987,393.

With an increase of 1,371,863 short tons in the production of coal in 1897 as compared with 1896, West Virginia attains a total output more than 2,000,000 tons larger than her rival State, Ohio, and acquires indisputable title to third place in the rank of coal-producing States. In Mineral Resources for 1894 the prediction was hazarded that West Virginia would supplant Ohio in the list of coal producers before the close of the Century. It has been accomplished in half the time stated in the prediction.

There has been but one break in an otherwise steadily increasing production during nineteen years of West Virginia's history. In 1877 the product of the State was only 1,120,000 short tons, less than 8 per cent of the product in 1897. In 1887 the product had quadrupled, reaching 4,881,620 short tons, a little more than one-third of the output ten years later. It is not to be supposed that the production will increase in the same proportion during the next decade, but it is possible, if not probable, that by the time the next century is ten years old, West Virginia will be the second coal-producing State in the country.

While the miners' strike of 1897 was on the whole beneficial in its effect upon the coal-mining industry of West Virginia, its influence was adversely felt in at least one county. Taking the labor statistics for the entire State during the year, it is seen that the average working time increased from two hundred and one days in 1896 to two hundred and five days in 1897, and that the number of employees increased 1,426, many miners from Ohio and Pennsylvania crossing into West Virginia to seek employment. The most effective work of the strikers was accomplished in the New and Kanawha rivers region. In Kanawha County 19 mines were affected, and 1,820 men out of 2,612 were idle on account of the strike, an average of seventy days. The total amount of working time lost was 127,172 days, and the product of the county decreased 196,722 short tons, about 1½ tons for each day lost. In Fayette County 1,931 men, employed at 20 mines, were on strike, an average of fifty-seven days, entailing a total loss of 110,715 days of working time, but in this county the effects of the strike on the production were not manifest. The output increased 467,968 short tons, or over 13 per cent, and the average working time increased from one hundred and eighty five to one hundred and ninety days. Only 40 per cent of the Fayette County mines, and less than one-third of the miners were affected by the strike, whereas in Kanawha County about two-thirds of both were affected. Moreover, the mines of Fayette County, where the men did not strike, increased their production to such an extent that they not only made up for the loss at the striking mines in the same county, but shipped nearly 500,000 tons more than in 1896 to

markets made by the cutting off of the supply from Pennsylvania and Ohio.

The Pocahontas region was practically exempt from strikes, 291 men in McDowell County and 250 men in Mercer County being on strike for an average of only eight and twelve days, respectively.

Altogether 70 mines out of 198 in the State were shut down at some time during the year by strikes. The total number of men involved was 6,136, who were idle for an average of fifty-three and one-half days, and caused a total loss in working time of 328,000 days, distributed among the following counties:

*Strikes in West Virginia coal mines during 1897.*

| County. | Number of mines where strikes occurred. | Number of men on strike. | Average number of days idle. | Total number of working days lost. |
|---|---|---|---|---|
| Barbour | 1 | 65 | 25 | 1,625 |
| Brooke | 1 | 15 | 26 | 390 |
| Fayette | 20 | 1,931 | 57 | 110,715 |
| Harrison | 4 | 233 | 47 | 11,034 |
| Kanawha | 19 | 1,820 | 70 | 127,172 |
| Marion | 3 | 665 | 55 | 36,615 |
| Marshall | 3 | 265 | 35 | 9,280 |
| Mason | 2 | 65 | 25 | 1,650 |
| McDowell | 6 | 291 | 8 | 2,317 |
| Mercer | 2 | 250 | 12 | 3,075 |
| Mingo | 2 | 135 | 23 | 3,160 |
| Ohio | 3 | 118 | 82 | 9,663 |
| Preston | 2 | 90 | 25 | 2,280 |
| Raleigh | 1 | 118 | 18 | 2,124 |
| Taylor | 1 | 75 | 92 | 6,900 |
| The State | 70 | 6,136 | 53½ | 328,000 |

But a small proportion, comparatively, of West Virginia's coal product is won by machines, though their use is on the increase. In 1891 2.23 per cent of the total output was machine mined; in 1896 the percentage was 3.35, and in 1897 4.73 per cent, or a total of 673,523 short tons was won by machines.

The following tables exhibit the details of production in the last two years:

*Coal product of West Virginia in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Barbour | 2 | 22,915 | 1,149 | ..... | ..... | 24,064 | $16,018 | $0.67 | 250 | 42 |
| Brooke | 3 | 32,085 | 11,239 | 100 | ..... | 43,424 | 31,488 | .73 | 151 | 105 |
| Fayette | 52 | 2,879,275 | 29,764 | 13,168 | 611,365 | 3,533,572 | 2,403,457 | .68 | 185 | 5,947 |
| Grant | 2 | 8,548 | 172 | ..... | ..... | 8,720 | 13,080 | 1.50 | 160 | 31 |
| Harrison | 8 | 212,932 | 8,673 | 600 | 9,482 | 231,687 | 134,181 | .58 | 201 | 467 |
| Kanawha | 28 | 1,058,766 | 27,542 | 6,133 | 24,442 | 1,116,883 | 791,468 | .71 | 175 | 2,314 |
| Marion | 11 | 1,201,265 | 8,724 | 12,841 | 289,073 | 1,511,903 | 863,766 | .57 | 248 | 1,899 |
| Marshall | 4 | 169,107 | 11,352 | 1,151 | ..... | 181,610 | 122,526 | .67 | 224 | 254 |
| Mason | 3 | 55,875 | 42,373 | 1,888 | ..... | 100,136 | 82,964 | .83 | 228 | 249 |
| McDowell | 28 | 1,863,060 | 11,169 | 7,030 | 1,002,427 | 2,883,686 | 1,702,742 | .60 | 221 | 3,557 |
| Mercer | 7 | 667,195 | 6,181 | 3,672 | 262,034 | 939,082 | 556,146 | .59 | 202 | 1,110 |
| Mineral | 4 | 549,476 | 2,995 | 4,115 | ..... | 556,586 | 378,138 | .68 | 188 | 644 |
| Mingo | 7 | 209,546 | 2,047 | ..... | ..... | 211,593 | 137,099 | .65 | 199 | 350 |
| Monongalia | 2 | 35,902 | 224 | 101 | 7,070 | 43,297 | 19,374 | .45 | 128 | 74 |
| Ohio | 8 | 81,045 | 35,640 | 783 | 16,057 | 133,525 | 93,822 | .70 | 180 | 204 |
| Preston | 3 | 7,729 | 95,363 | 2,323 | 34,344 | 139,759 | 83,554 | .60 | 266 | 180 |
| Putnam | 4 | 185,528 | 300 | 125 | ..... | 185,953 | 192,557 | 1.04 | 201 | 384 |
| Taylor | 4 | 122,647 | 707 | ..... | ..... | 123,354 | 63,157 | .51 | 83 | 310 |
| Tucker | 6 | 407,768 | 2,919 | 2,063 | 275,676 | 688,426 | 452,257 | .66 | 234 | 812 |
| Raleigh, Wayne | 3 | 67,389 | 2,908 | 302 | 23,437 | 94,036 | 73,891 | .78 | 185 | 145 |
| Small mines | ..... | ..... | 125,000 | ..... | ..... | 125,000 | 125,000 | ..... | ..... | ..... |
| Total | 189 | 9,838,053 | 426,441 | 56,395 | 2,555,407 | 12,876,296 | 8,336,685 | .65 | 201 | 19,078 |

**In the following table will be found the total product of the State, by counties, since 1886, with the increases and decreases in 1897, as compared with 1896:**

*Coal product of West Virginia from 1886 to 1897, by counties.*

[Short tons.]

| County. | 1886. | 1887. | 1888. | 1889. | 1890. |
|---|---|---|---|---|---|
| Brooke | 22,880 | 40,366 | 11,568 | 31,119 | 36,794 |
| Fayette | 1,413,778 | 1,252,457 | 1,977,030 | 1,450,780 | 1,591,298 |
| Harrison | 234,597 | 154,220 | 109,515 | 174,115 | 144,403 |
| Kanawha | 876,785 | 1,126,839 | 863,600 | 1,218,236 | 1,421,116 |
| McDowell | ..... | ..... | ..... | 586,529 | 956,222 |
| Marion | 172,379 | 365,844 | 363,974 | 282,467 | 455,728 |
| Marshall | 251,333 | 92,368 | 47,702 | 47,706 | 123,669 |
| Mason | 150,878 | 140,968 | 72,410 | 185,030 | 145,314 |
| Mercer | 328,733 | 575,885 | 969,395 | 921,741 | 1,005,870 |
| Mineral | 361,312 | 478,636 | 456,361 | 493,464 | 573,684 |
| Monongalia | ..... | ..... | ..... | 74,031 | 31,360 |
| Ohio | (*a*) | 131,936 | 140,019 | 143,170 | 103,586 |
| Preston | 170,721 | 276,224 | 231,540 | 129,932 | 178,439 |
| Putnam | (*b*) | 53,200 | 145,440 | 218,752 | 205,178 |
| Taylor | (*c*) | 168,000 | 55,729 | 83,012 | 76,618 |
| Tucker | 22,400 | 24,707 | 62,517 | 173,492 | 245,378 |
| Other counties and small mines | ..... | ..... | ..... | 18,304 | 100,000 |
| Total | 4,005,796 | 4,881,620 | 5,498,800 | 6,231,880 | 7,394,654 |

| County. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| Barbour | ..... | ..... | ..... | 9,720 |
| Brooke | 33,950 | 26,521 | 32,900 | 44,995 |
| Fayette | 2,307,421 | 2,455,400 | 2,652,860 | 2,566,612 |
| Grant | ..... | ..... | ..... | 6,563 |
| Harrison | 150,522 | 221,726 | 193,632 | 255,634 |
| Kanawha | 1,324,788 | 1,317,621 | 1,446,252 | 1,084,359 |
| Logan | ..... | ..... | ..... | 11,611 |
| McDowell | 1,267,136 | 1,696,975 | 2,166,478 | 3,158,369 |
| Marion | 1,000,047 | 919,704 | 1,062,324 | 1,399,898 |
| Marshall | 193,703 | 118,974 | 158,997 | 156,320 |
| Mason | 159,990 | 159,644 | 153,633 | 140,802 |
| Mercer | 1,172,910 | 1,191,952 | 995,428 | 1,072,950 |
| Mineral | 693,574 | 582,402 | 653,025 | 563,270 |
| Monongalia | 31,000 | 48,900 | 38,600 | 79,558 |

*a* Included in product of Marshall County.
*b* Included in product of Mason County.
*c* Included in product of Harrison County.

*Coal product of West Virginia from 1886 to 1897, by counties*—Continued.

[Short tons.]

| County. | 1891. | 1892. | 1893. | 1894. |
|---|---|---|---|---|
| Ohio | 90,600 | 120,323 | 80,610 | 102,910 |
| Preston | 140,399 | 98,006 | 82,672 | 40,854 |
| Putnam | 94,230 | 89,886 | 209,881 | 220,138 |
| Raleigh | ..... | 95,824 | 92,330 | 84,359 |
| Randolph | ..... | ..... | ..... | 16,203 |
| Taylor | 101,661 | 115,145 | 78,640 | 102,682 |
| Tucker | 358,734 | 359,752 | 476,372 | 363,950 |
| Wayne | ..... | ..... | ..... | 21,000 |
| Other counties and small mines | 100,000 | 120,000 | 133,934 | 125,000 |
| Total | 9,220,665 | 9,738,755 | 10,708,578 | 11,627,757 |

| County. | 1895. | 1896. | 1897. | Increase, 1897. | Decrease, 1897. |
|---|---|---|---|---|---|
| Barbour | 13,306 | 24,064 | 56,054 | 31,990 | ..... |
| Brooke | 74,841 | 43,424 | 49,453 | 6,029 | ..... |
| Fayette | 3,264,825 | 3,533,572 | 4,001,540 | 467,968 | ..... |
| Grant | 392 | 8,720 | 28 | ..... | 8,692 |
| Harrison | 292,693 | 231,687 | 334,817 | 103,130 | ..... |
| Kanawha | 1,134,798 | 1,116,883 | 920,161 | ..... | 196,722 |
| Logan | 24,648 | ..... | ..... | ..... | ..... |
| McDowell | 2,395,365 | 2,883,686 | 3,235,344 | 351,658 | ..... |
| Marion | 1,257,563 | 1,511,903 | 1,739,846 | 227,943 | ..... |
| Marshall | 194,077 | 181,610 | 147,532 | ..... | 34,078 |
| Mason | 120,766 | 100,136 | 120,945 | 20,809 | ..... |
| Mercer | 687,364 | 939,082 | 915,691 | ..... | 23,391 |
| Mineral | 675,610 | 556,586 | 580,520 | 23,934 | ..... |
| Mingo | 26,370 | 211,593 | 368,520 | 156,927 | ..... |
| Monongalia | 67,510 | 43,297 | 51,307 | 8,010 | ..... |
| Ohio | 169,834 | 133,525 | 111,909 | ..... | 21,616 |
| Preston | 107,053 | 139,759 | 169,610 | 29,851 | ..... |
| Putnam | 120,482 | 185,953 | 110,971 | ..... | 74,982 |
| Raleigh | 88,188 | 92,136 | 83,178 | ..... | 8,958 |
| Randolph | 200 | ..... | ..... | ..... | ..... |
| Taylor | 93,252 | 123,354 | 281,227 | 157,873 | ..... |
| Tucker | 449,991 | 688,426 | 844,506 | 156,080 | ..... |
| Wayne | 3,833 | 1,900 | ..... | ..... | 1,900 |
| Other counties and small mines | 125,000 | 125,000 | 125,000 | ..... | ..... |
| Total | 11,387,961 | 12,876,296 | 14,248,159 | a1,371,863 | ..... |

a Net increase.

The annual output since 1873 has been as follows:

*Coal product of West Virginia since 1873.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1873 | 672,000 | 1886 | 4,005,796 |
| 1874 | 1,120,000 | 1887 | 4,881,620 |
| 1875 | 1,120,000 | 1888 | 5,498,800 |
| 1876 | 896,000 | 1889 | 6,231,880 |
| 1877 | 1,120,000 | 1890 | 7,394,654 |
| 1878 | 1,120,000 | 1891 | 9,220,665 |
| 1879 | 1,400,000 | 1892 | 9,738,755 |
| 1880 | 1,568,000 | 1893 | 10,708,578 |
| 1881 | 1,680,000 | 1894 | 11,627,757 |
| 1882 | 2,240,000 | 1895 | 11,387,961 |
| 1883 | 2,335,833 | 1896 | 12,876,296 |
| 1884 | 3,360,000 | 1897 | 14,248,159 |
| 1885 | 3,369,062 | | |

The decrease in 1895 was the first break in a series of fifteen years. In each year since 1881 until the close of 1894 the product of West Virginia has shown an uninterrupted gain, the total increase in fourteen years amounting to 10,059,757 short tons, an average of 718,554 short tons per year. The decrease in 1895 brings the total increase since 1881 down to 9,819,961 short tons, and the average for fifteen years down to 654,664 short tons, while the increased product in 1896 and 1897 makes the total increase in seventeen years 12,680,159 short tons—a yearly average increase of 745,892 tons, as shown in the following table:

*Annual increase in the coal product of West Virginia since 1880.*

| Year. | Short tons. | Year. | Short tons. |
|---|---|---|---|
| 1881 over 1880 | 112,000 | 1894 over 1893 | 919,179 |
| 1882 over 1881 | 560,000 | | |
| 1883 over 1882 | 95,833 | Total increase in fourteen years. | 10,059,757 |
| 1884 over 1883 | 1,024,167 | Decrease in 1895 | 239,796 |
| 1885 over 1884 | 9,062 | | |
| 1886 over 1885 | 636,734 | Total increase in fifteen years | 9,819,961 |
| 1887 over 1886 | 875,824 | | |
| 1888 over 1887 | 617,180 | 1896 over 1895 | 1,488,335 |
| 1889 over 1888 | 733,080 | 1897 over 1896 | 1,371,863 |
| 1890 over 1889 | 1,162,774 | | |
| 1891 over 1890 | 1,826,011 | Total increase in seventeen years. | 12,680,159 |
| 1892 over 1891 | 518,090 | | |
| 1893 over 1892 | 969,823 | Average annual increase | 745,892 |

Uniformly with the discussion of the product of other States the following tables are given, showing the average price per ton and the statistics of labor employed and working time for a series of years:

*Average prices for West Virginia coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Barbour | ..... | ..... | ..... | ..... | ..... | ..... | $0.80 | $0.67 | $0.56 |
| Brooke | $0.73 | $0.78 | $0.83 | $0.94 | $0.88 | $0.77 | .72 | .73 | .75 |
| Fayette | .90 | .90 | .85 | .84 | .80 | .72 | .72 | .68 | .67 |
| Harrison | .66 | .70 | .72 | .77 | .67 | .71 | .67 | .58 | .61 |
| Kanawha | .96 | .96 | .97 | .92 | .86 | .87 | .79 | .71 | .71 |
| Logan | ..... | ..... | ..... | ..... | ..... | .65 | .60 | ..... | ..... |
| Marion | .71 | .69 | .70 | .74 | .70 | .86 | .64 | .57 | .56 |
| Marshall | .75 | .82 | .80 | .79 | .78 | .73 | .67 | .67 | .72 |
| Mason | .91 | .93 | .90 | .96 | .93 | .86 | .85 | .83 | .82 |
| McDowell | .68 | .71 | .68 | .73 | .70 | .67 | .55 | .60 | .56 |
| Mercer | .65 | .75 | .74 | .76 | .69 | .71 | .56 | .59 | .58 |
| Mineral | .80 | .88 | .84 | .77 | .82 | .77 | .63 | .68 | .68 |
| Mingo | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .65 | .63 |
| Monongalia | .72 | .64 | .65 | .72 | .72 | .87 | .77 | .45 | .65 |
| Ohio | .89 | .97 | .78 | .99 | .82 | .84 | .76 | .70 | .65 |
| Preston | .66 | .72 | .64 | .67 | .69 | .68 | .65 | .60 | .60 |
| Putnam | 1.12 | .97 | 1.19 | 1.11 | 1.01 | 1.12 | .95 | 1.04 | .85 |
| Raleigh | ..... | ..... | ..... | .89 | 1.00 | .79 | .79 | .78 | .79 |
| Randolph | ..... | ..... | ..... | ..... | 1.00 | .90 | ..... | ..... | ..... |
| Taylor | .64 | .76 | .61 | .61 | .58 | .62 | .55 | .51 | .58 |
| Tucker | .70 | .76 | .65 | .70 | .71 | .62 | .68 | .66 | .68 |
| Wayne | ..... | ..... | ..... | ..... | ..... | .76 | ..... | ..... | ..... |
| The State.. | .82 | .84 | .80 | .80 | .77 | .75 | .68 | .65 | .63 |

*Statistics of labor employed and working time at West Virginia coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Barbour | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Brooke | 50 | 202 | 59 | 274 | 51 | 226 | 79 | 260 |
| Fayette | 2,824 | 225 | 3,823 | 245 | 4,102 | 252 | 4,487 | 224 |
| Harrison | 305 | 194 | 285 | 214 | 473 | 148 | 298 | 211 |
| Kanawha | 2,756 | 230 | 2,802 | 217 | 2,677 | 217 | 2,306 | 276 |
| Marion | 865 | 218 | 1,408 | 279 | 1,114 | 275 | 1,536 | 203 |
| Marshall | 175 | 265 | 190 | 257 | 210 | 199 | 245 | 194 |
| Mason | 480 | 229 | 311 | 236 | 338 | 215 | 376 | 194 |
| McDowell | 1,315 | 183 | 1,536 | 227 | 2,061 | 195 | 3,375 | 185 |
| Mercer | 1,465 | 217 | 1,510 | 244 | 1,621 | 211 | 1,281 | 209 |
| Mineral | 620 | 279 | 624 | 259⅓ | 500 | 244 | 666 | 229 |
| Monongalia | 55 | 260 | 50 | 260 | 72 | 308 | 60 | 225 |
| Ohio | 153 | 268 | 131 | 276 | 222 | 243 | 135 | 221 |
| Preston | 337 | 282 | 304 | 221 | 170 | 209 | 200 | 140 |
| Putnam | 375 | 194 | 526 | 143 | 483 | 180 | 520 | 204 |
| Raleigh | ..... | ..... | ..... | ..... | 120 | 167 | 145 | 165 |
| Randolph | ..... | ..... | ..... | ..... | ..... | ..... | 8 | 100 |
| Taylor | 108 | 256 | 118 | 287 | 128 | 282 | 105 | 260 |
| Tucker | 353 | 309 | 550 | 306 | 525 | 306 | 675 | 267 |
| The State | 12,236 | 227 | 14,227 | 237 | 14,867 | 228 | 16,524 | 219 |

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Barbour | ..... | ..... | 20 | 222 | 42 | 250 | 83 | 253 |
| Brooke | 100 | 205 | 126 | 212 | 105 | 151 | 76 | 218 |
| Fayette | 4,594 | 164 | 5,537 | 201 | 5,947 | 185 | 6,293 | 190 |
| Harrison | 439 | 178 | 513 | 212 | 467 | 201 | 637 | 188 |
| Kanawha | 2,706 | 155 | 2,738 | 161 | 2,314 | 175 | 2,612 | 170 |
| Logan | 150 | 70 | 65 | 160 | ..... | ..... | ..... | ..... |
| Marion | 1,479 | 274 | 1,812 | 238 | 1,899 | 248 | 2,026 | 258 |
| Marshall | 220 | 177 | 336 | 232 | 254 | 224 | 272 | 218 |
| Mason | 391 | 177 | 367 | 167 | 249 | 228 | 214 | 254 |
| McDowell | 3,891 | 207 | 3,955 | 199 | 3,557 | 221 | 3,844 | 199 |
| Mercer | 1,274 | 211 | 1,148 | 169 | 1,110 | 202 | 969 | 211 |
| Mineral | 564 | 189 | 656 | 229 | 644 | 188 | 436 | 289 |

The production, by counties, in 1896 and 1897, with the distribution of the product for consumption, and the statistics of labor employed are shown in the following tables:

*Coal product of Wyoming in 1896, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Carbon | 7 | 343,247 | 8,925 | 11,085 | ..... | 363,257 | $467,187 | $1.29 | 169 | 561 |
| Sheridan | 4 | 49,792 | 1,500 | ..... | ..... | 51,292 | 53,381 | 1.04 | 210 | 69 |
| Sweetwater | 8 | 1,019,219 | 1,955 | 25,868 | ..... | 1,047,042 | 1,275,344 | 1.22 | 189 | 1,339 |
| Uinta | 3 | 306,655 | 2,998 | 3,780 | ..... | 313,433 | 425,565 | 1.36 | 221 | 432 |
| Converse, Crook, Fremont, Johnson, Weston | 6 | 383,555 | 2,489 | 27,518 | 41,038 | 454,600 | 682,708 | 1.50 | 278 | 548 |
| Total | 28 | 2,102,468 | 17,867 | 68,251 | 41,038 | 2,229,624 | 2,904,185 | 1.30 | 209 | 2,949 |

*Coal product of Wyoming in 1897, by counties.*

| County. | Number of mines. | Loaded at mines for shipment. | Sold to local trade and used by employees. | Used at mines for steam and heat. | Made into coke. | Total product. | Total value. | Average price per ton. | Average number of days active. | Average number of employees. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | | | | |
| Carbon | 4 | 382,803 | 4,746 | 16,342 | ..... | 403,891 | $488,307 | $1.21 | 198 | 513 |
| Sweetwater | 8 | 1,086,719 | 4,755 | 41,960 | ..... | 1,133,434 | 1,232,686 | 1.09 | 214 | 1,362 |
| Uintah | 3 | 406,002 | 3,661 | 8,321 | ..... | 417,984 | 474,590 | 1.14 | 215 | 541 |
| Converse, Weston | 3 | 497,029 | 2,641 | 27,351 | 50,976 | 577,997 | 866,995 | 1.50 | 253 | 596 |
| Johnson, Sheridan | 2 | 62,538 | 2,042 | ..... | ..... | 64,580 | 74,116 | 1.15 | 223 | 125 |
| Total | 20 | 2,435,091 | 17,845 | 93,974 | 50,976 | 2,597,886 | 3,136,694 | 1.21 | 219 | 3,137 |

*Total product of coal in Wyoming, by counties*—Continued.

[Short tons.]

| Year. | Converse County. | Other counties. | Total. | Value. |
|---|---|---|---|---|
| 1868 | | | 6,925 | |
| 1869 | | | 49,382 | |
| 1870 | | | 105,295 | |
| 1871 | | | 147,328 | |
| 1872 | | | 221,745 | |
| 1873 | | | 259,700 | |
| 1874 | | | 219,061 | |
| 1875 | | | 300,808 | |
| 1876 | | | 334,550 | |
| 1877 | | | 342,853 | |
| 1878 | | | 333,200 | |
| 1879 | | | 400,991 | |
| 1880 | | | 527,811 | |
| 1881 | | | 628,181 | |
| 1882 | | 8,855 | 707,764 | |
| 1883 | | 36,651 | 779,689 | |
| 1884 | | 45,189 | 902,620 | |
| 1885 | | 17,207 | 807,328 | $2,421,984 |
| 1886 | | | 829,355 | 2,488,065 |
| 1887 | | 55,093 | 1,170,318 | 3,510,954 |
| 1888 | 29,933 | 11,000 | 1,481,540 | 4,444,620 |
| 1889 | 17,393 | 5,847 | 1,388,276 | 1,748,617 |
| 1890 | 25,748 | 9,520 | 1,870,366 | 3,183,669 |
| 1891 | 27,897 | 7,265 | 2,327,841 | 3,555,275 |
| 1892 | 45,907 | 18,300 | 2,503,839 | 3,168,776 |
| 1893 | 56,320 | 47,446 | 2,439,311 | 3,290,904 |
| 1894 | 74,000 | 58,884 | 2,417,463 | 3,170,392 |
| 1895 | 65,090 | 93,897 | 2,246,911 | 2,977,901 |
| 1896 | 78,000 | 56,364 | 2,229,624 | 2,904,185 |
| 1897 | 79,000 | 64,580 | 2,597,886 | 3,136,694 |

The following tables show the average prices per ton which have obtained in the more important counties since 1889, and the statistics of labor engaged in the production for eight years:

*Average prices for Wyoming coal since 1889 in counties producing 10,000 tons or over.*

| County. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897 |
|---|---|---|---|---|---|---|---|---|---|
| Carbon..... | $0.98 | $1.75 | $1.50 | $1.11 | $1.53 | $1.26 | $1.25 | $1.29 | $1.21 |
| Converse..... | 1.78 | 1.74 | 1.77 | 1.63 | 1.58 | 1.50 | 1.67 | 1.50 | 1.50 |
| Sheridan..... | 1.50 | 1.50 | 1.00 | ..... | 1.67 | 1.53 | 1.08 | 1.04 | 1.12 |
| Sweetwater .... | 1.20 | 1.70 | 1.48 | 1.16 | 1.14 | 1.23 | 1.27 | 1.22 | 1.09 |
| Uinta..... | 1.56 | 1.78 | 1.71 | 1.56 | 1.74 | 1.61 | 1.39 | 1.36 | 1.14 |
| Weston ..... | ..... | 1.45 | 1.50 | 1.50 | 1.50 | 1.50 | 1.51 | 1.50 | 1.50 |
| The State .. | 1.26 | 1.70 | 1.53 | 1.27 | 1.35 | 1.31 | 1.33 | 1.30 | 1.21 |

*Statistics of labor employed and working time at Wyoming coal mines.*

| County. | 1890. | | 1891. | | 1892. | | 1893. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Carbon..... | 714 | ..... | 609 | ..... | 505 | 241 | 622 | 164 |
| Converse..... | 30 | ..... | 85 | ..... | 105 | 210 | 110 | 201 |
| Sheridan..... | ..... | ..... | ..... | ..... | ..... | ..... | 48 | 241 |
| Sweetwater .... | 1,672 | ..... | 1,754 | ..... | 1,643 | 198 | 1,729 | 179 |
| Uinta..... | 422 | ..... | 548 | ..... | 462 | 243 | 439 | 201 |
| Weston ..... | 416 | ..... | 402 | ..... | 400 | 297 | 400 | 250 |
| The State .. | 3,272 | ..... | 3,411 | ..... | 3,133 | 225 | 3,378 | 189 |

| County. | 1894. | | 1895. | | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. | Average number employed. | Average working days. |
| Carbon..... | 539 | 179 | 534 | 164 | 561 | 169 | 513 | 198 |
| Converse..... | 140 | 229 | 149 | 245 | 90 | 300 | 115 | 228 |
| Sheridan..... | 90 | 269 | 125 | 257 | 69 | 210 | 95 | 300 |
| Sweetwater .... | 1,622 | 182 | 1,769 | 158 | 1,339 | 189 | 1,362 | 214 |
| Uinta..... | 245 | 108 | 384 | 187 | 432 | 221 | 541 | 215 |
| Weston ..... | 377 | 261 | 445 | 264 | 440 | 280 | 481 | 259 |
| The State .. | 3,032 | 190 | 3,449 | 184 | 2,949 | 209 | 3,137 | 219 |

# COKE.

By EDWARD W. PARKER.

[The ton used in this report is uniformly the short ton of 2,000 pounds.]

## INTRODUCTION.

The report presented herewith is of a character uniform, as far as possible, with the chapters on coke production in preceding volumes of Mineral Resources. Previous to the report for 1896 this chapter was prepared by the late Joseph D. Weeks, of Pittsburg, Pa., and the lines laid down by Mr. Weeks have been generally followed in the report for 1896 and the present one. The plan adopted by Mr. Weeks was to limit the use of the word "coke" to the product obtained from bituminous coal by distilling or burning it in retorts, ovens, or pits, and which may be termed "oven coke." The statistics in no way refer to the coke obtained as a by-product in the manufacture of illuminating gas, where no attention is given to the quality of the coke product. Recent developments, however, in the construction of by-product ovens where the by-products of gas, tar, and ammonia are given equal importance with the coke, render a slight departure from this rule necessary. So long as the coke is the primary product, and particularly when the coke is used for metallurgical purposes, its comprehension in these reports is necessary and proper. The increasing use of coke for domestic purposes and the building of large plants for making by-product coke make a deviation from the previous reports advisable. There is now in course of construction at Everett, near Boston, Mass., a bank of 400 by-product ovens, whose production will be included in these reports. It can not properly be classed as gas coke, although it is proposed to use the gas distilled from the coal for domestic purposes, and as the output for similar plants is elsewhere included in the product of oven coke, it can only be considered as belonging to that class.

Another deviation from the rules adopted by Mr. Weeks is in the application of the term "establishments." In Mr. Weeks' reports an "establishment" was usually considered to cover all ovens or banks of ovens operated under one general management. In the reports for 1896 and 1897 any oven or bank of ovens included in one statement is considered a separate establishment.

The coal used in coking in the United States is drawn from all five of its great bituminous coal fields: (1) The Appalachian; (2) the Central; (3) the Western; (4) the Rocky Mountain, and (5) the Pacific coast. The Triassic fields in North Carolina and near Richmond, Va., and the northern field of Michigan do not produce any coke. The Appalachian field is the great source of supply, for while there are 13 coke-producing States outside of the Appalachian field to 9 within it, the output outside of the field in 1897 was only 546,954 short tons out of a total product of 13,288,984 short tons. In 1896 the total output of coke was 11,788,773 short tons, of which 553,863 tons were made outside of the Appalachian field, and in 1895 only 445,473 short tons out of a total of 13,333,714 tons were made outside the great field. The product of Wisconsin is included in that of the 13 States outside the Appalachian field, although the coal from which it is made is drawn from the mines of Pennsylvania.

The writer desires to renew his acknowledgments of the services rendered by Miss Belle Hill, of Pittsburg, Pa. Miss Hill was associated with Mr. Weeks for several years and is thoroughly familiar with his methods and with the details of the work. The knowledge and experience acquired by Miss Hill through her association with Mr. Weeks have been of invaluable assistance in the preparation of this report. The tabulated statements presented herewith have all been prepared by Miss Hill. They are complete and accurate, no revision of the figures having been found necessary.

## PRODUCTION OF COKE IN THE UNITED STATES.

As shown in the following table the amount of coke produced in the United States in 1897 was 13,288,984 short tons, against 11,788,773 short tons in 1896. While the output in 1897 was 1,500,211 short tons more than that of 1896, it was still about 45,000 tons below the product in 1895, when the coke made in the United States reached a total of 13,333,714 short tons. The year 1895 was one of excessive production, and prices were very low—lower than at any period in the history of coke making, except those of 1894, when the general depression in values, following the panic of 1893, brought the average for the year down to $1.34 per ton. More conservative management marked the industry in 1896. Manufacturers of Connellsville coke put the prices of this product at $1.75 to $2 for furnace, $2.30 for foundry, and $2.35 for crushed, maintaining these prices throughout the year. In doing this tonnage was sacrificed to prices, the output for the region showing a loss of over 2,700,000 tons, whereas the total decrease during the year was only 1,544,941 tons, part of the loss in the Connellsville region being made up by increases in other parts of Pennsylvania, in West Virginia, Ohio, and other less important States. The results in value to the Connellsville producers are exhibited in the fact that an output of 5,462,490 tons in 1896 was worth $10,018,946, only $100,000

less than the value of 8,181,179 tons produced in 1895, and that the total output of 11,788,773 tons in 1896 was worth nearly $2,500,000 more than the 13,333,714 tons produced in 1895.

Prices were not so strongly maintained in 1897 as in 1896, but they show a great improvement over those of 1894 and 1895. Consumptive demand was in good proportion to the supply, prices were remunerative, and the total value was nearly $3,000,000 more than that of the slightly larger output in 1895.

Pennsylvania's product in 1897 was 1,610,422 tons larger than in 1896, and 437,291 tons less than it was in 1895, the output of the Connellsville region not having regained all the tonnage lost through maintaining the higher prices in 1896. The product of the State was 67.5 per cent of the total output; in 1896, Pennsylvania produced only 62.4 per cent, the lowest percentage ever recorded; in 1895 the State produced 70.5 per cent; in 1894, 65.9 per cent. West Virginia's product decreased 177,089 tons in 1897, and was less than the output of Alabama in 1896, but as the latter also fell off in production in 1897, West Virginia remains in second place with 11.1 per cent of the total, against 14 per cent in 1896, 9.6 per cent in 1895, and 13 per cent in 1894. Alabama produced 10.9 per cent of the total in 1897, 12.5 per cent in 1896, 10.9 per cent in 1895, and 10 per cent in 1894. Tennessee succeeds Colorado in fourth place, Virginia takes fifth place, and Colorado drops back to sixth place, after having held either fourth or fifth place since 1882. Tennessee produced 2.8 per cent of the total product in 1897, Virginia 2.7 per cent, and Colorado 2.6 per cent.

The number of coking establishments in 1897 was 336, a decrease of 5 from 1896, but the total number of ovens increased from 46,944 to 47,788. There were 575 ovens in course of construction at the close of 1897 against 383 at the close of 1896.

**In the following table will be found a statement of the production of coke in the United States in 1897, by States, followed, for purposes of comparison, by similar tables for 1896 and 1895:**

*Manufacture of coke in the United States, by States and Territories, in 1897.*

| State or Territory. | Establishments. | Ovens. | | Coal used. | Yield of coal in coke. | Coke produced. | Total value of coke. | Value of coke per ton. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Per ct.* | *Short tons.* | | |
| Alabama | 25 | 5,365 | *a* 120 | 2,451,475 | 58.8 | 1,443,017 | $3,094,461 | $2.14 |
| Colorado (*b*) | 12 | *c* 1,273 | 0 | 616,592 | 55.6 | 342,653 | 999,216 | 2.916 |
| Georgia | 1 | 300 | 0 | 67,000 | 49.3 | 33,000 | 42,240 | 1.28 |
| Illinois | 2 | 126 | 0 | 3,591 | 43 | 1,549 | 2,895 | 1.87 |
| Indiana | 2 | 94 | 0 | 7,022 | 41.4 | 2,904 | 5,795 | 1.995 |
| Indian Territory | 2 | 130 | 0 | 68,495 | 44.3 | 30,364 | 104,725 | 3.45 |
| Kansas | 4 | 57 | 0 | 11,772 | 52.5 | 6,181 | 9,272 | 1.50 |
| Kentucky | 5 | 268 | 0 | 64,234 | 50 | 32,117 | 45,454 | 1.41 |
| Missouri | 3 | 15 | 0 | 4,627 | 56 | 2,593 | 3,890 | 1.50 |
| Montana | 3 | 303 | 0 | 139,907 | 48.5 | 67,849 | 467,481 | 6.89 |
| New Mexico | 2 | 126 | 0 | 2,585 | 55.6 | 1,438 | 3,232 | 2.25 |
| New York (*d*) | 1 | 25 | 0 | ..... | ..... | ..... | ..... | ..... |
| Ohio | 9 | 433 | 0 | 151,545 | 62.7 | 95,087 | 235,784 | 2.48 |
| Pennsylvania (*e*) | 153 | 26,910 | 307 | 13,538,646 | 66.2 | 8,966,924 | 13,727,966 | 1.53 |
| Tennessee | 15 | 1,948 | 0 | 667,996 | 55 | 368,769 | 667,656 | 1.81 |
| Texas | 1 | 20 | 0 | 700 | 56.3 | 394 | ..... | ..... |
| Utah (*f*) | 1 | 104 | 0 | ..... | ..... | ..... | ..... | ..... |
| Virginia | 6 | 1,453 | 110 | 574,542 | 61.6 | 354,067 | 495,864 | 1.40 |
| Washington | 3 | 120 | 0 | 39,124 | 67 | 26,189 | 115,754 | 4.42 |
| West Virginia | 84 | 8,404 | 38 | 2,413,283 | 61 | 1,472,666 | 1,933,808 | 1.31 |
| Wisconsin | 1 | 120 | 0 | 29,207 | 59 | 17,216 | 75,000 | 4.36 |
| Wyoming | 1 | 74 | 0 | 54,976 | 43.7 | 24,007 | 72,021 | 3.00 |
| Total | 336 | 47,668 | 575 | 20,907,319 | 63.5 | 13,288,984 | 22,102,514 | 1.663 |

*a* Semet-Solvay ovens.
*b* Includes coal used, coke produced, and its value in Utah.
*c* Includes 36 gas retorts.
*d* Production included with Pennsylvania.
*e* Includes coal used, coke produced, and its value in New York.
*f* Production included with Colorado.

In the following tables are given, by States, a statement of the production of coke in the United States in 1896 and 1895:

*Manufacture of coke in the United States, by States and Territories, in 1896.*

| State or Territory. | Establishments. | Ovens. | | Coal used. | Yield of coal in coke. | Coke produced. | Total value of coke. | Value of coke per ton. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Per ct.* | *Short tons.* | | |
| Alabama | 24 | 5,363 | 0 | 2,573,713 | 57.5 | 1,479,437 | $3,064,960 | $2.07 |
| Colorado (*a*) | 11 | *b* 1,275 | 0 | 639,238 | 56.9 | 363,760 | 1,046,306 | 2.88 |
| Georgia | 1 | 334 | 0 | 109,655 | 49 | 53,673 | 68,486 | 1.276 |
| Illinois | 3 | 127 | 0 | 3,900 | 66.7 | 2,600 | 5,200 | 2.00 |
| Indiana | 2 | 94 | 0 | 8,956 | 49 | 4,353 | 8,647 | 1.99 |
| Indian Territory | 2 | 130 | 0 | 53,028 | 40 | 21,021 | 73,574 | 3.50 |
| Kansas | 6 | 55 | 0 | 8,940 | 53.5 | 4,785 | 8,676 | 1.813 |
| Kentucky | 4 | 264 | 0 | 55,719 | 48.6 | 27,107 | 42,062 | 1.55 |
| Missouri | 3 | 7 | 0 | 4,471 | 55.9 | 2,500 | 4,131 | 1.65 |
| Montana | 3 | 303 | 0 | 113,165 | 53 | 60,078 | 425,483 | 7.08 |
| New Mexico | 1 | 50 | 0 | 39,286 | 61.7 | 24,228 | 48,453 | 2.00 |
| New York (*c*) | 1 | 25 | 0 | ..... | ..... | ..... | ..... | ..... |
| Ohio | 9 | 431 | 0 | 128,923 | 62.7 | 80,868 | 208,789 | 2.58 |
| Pennsylvania (*d*) | 158 | 26,658 | 154 | 11,124,610 | 66.1 | 7,356,502 | 13,182,859 | 1.792 |
| Tennessee | 15 | 1,861 | 100 | 600,379 | 56.5 | 339,202 | 624,011 | 1.84 |
| Texas | 1 | 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| Utah (*e*) | 1 | 104 | 0 | ..... | ..... | ..... | ..... | ..... |
| Virginia | 7 | 1,138 | 101 | 454,964 | 58.9 | 268,081 | 404,573 | 1.509 |
| Washington | 3 | 120 | 0 | 38,685 | 67 | 25,949 | 104,894 | 4.04 |
| West Virginia | 84 | 8,351 | 28 | 2,687,104 | 61.4 | 1,649,755 | 2,259,999 | 1.37 |
| Wisconsin | 1 | 120 | 0 | 8,648 | 62 | 5,332 | 21,000 | 3.94 |
| Wyoming | 1 | 74 | 0 | 41,038 | 47.6 | 19,542 | 58,626 | 3.00 |
| Total | 341 | 46,944 | 383 | 18,694,422 | 63 | 11,788,773 | 21,660,729 | 1.837 |

*a* Includes coal used, coke produced, and its value in Utah.
*b* Includes 36 gas retorts.
*c* Production included with Pennsylvania.
*d* Includes coal used, coke produced, and its value in New York.
*e* Production included with Colorado.

*Manufacture of coke in the United States, by States and Territories, in 1895.*

| State or Territory. | Establishments. | Ovens. | | Coal used. | Yield of coal in coke. | Coke produced. | Total value of coke. | Value of coke per ton. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Per ct.* | *Short tons.* | | |
| Alabama | 22 | 5,658 | 50 | 2,459,465 | 58.7 | 1,444,339 | $3,033,521 | $2.10 |
| Colorado (*a*) | 9 | *b* 1,169 | 0 | 580,584 | 58.6 | 340,357 | 940,987 | 2.76 |
| Georgia | 1 | 330 | 0 | 118,900 | 50.6 | 60,212 | 70,580 | 1.17 |
| Illinois | 3 | 129 | 0 | 3,600 | 62.5 | 2,250 | 4,500 | 2.00 |
| Indiana | 2 | 94 | 0 | 9,898 | 48.5 | 4,804 | 9,333 | 1.94 |
| Indian Territory | 1 | 80 | 0 | 11,825 | 43.8 | 5,175 | 17,657 | 3.41 |
| Kansas | 5 | 55 | 0 | 8,424 | 62.8 | 5,287 | 11,289 | 2.14 |
| Kentucky | 5 | 293 | 0 | 63,419 | 40.1 | 25,460 | 37,249 | 1.46 |
| Missouri | 3 | 10 | 0 | 3,120 | 65 | 2,028 | 2,442 | 1.20 |
| Montana | 3 | 303 | 0 | 55,770 | 45.4 | 25,337 | 189,856 | 7.49 |
| New Mexico | 1 | 50 | 0 | 22,385 | 65.5 | 14,663 | 29,491 | 2.01 |
| New York | 1 | 12 | 13 | 22,207 | 83.4 | 18,521 | ..... | ..... |
| Ohio | 8 | 377 | 0 | 51,921 | 56 | 29,050 | 69,655 | 2.40 |
| Pennsylvania | 99 | 26,042 | 170 | 14,211,567 | 66.2 | 9,404,215 | 11,908,162 | 1.266 |
| Tennessee | 12 | 1,903 | 0 | 684,655 | 57.9 | 396,790 | 754,926 | 1.90 |
| Texas | 1 | 6 | 0 | 530 | 54 | 286 | ..... | ..... |
| Utah (*c*) | 1 | 84 | 0 | ..... | ..... | ..... | ..... | ..... |
| Virginia | 5 | 832 | 350 | 410,737 | 59.6 | 244,738 | 322,564 | 1.32 |
| Washington | 3 | 110 | 0 | 22,973 | 65.9 | 15,129 | 64,632 | 4.27 |
| West Virginia | 78 | 7,834 | 55 | 2,087,816 | 61.6 | 1,285,206 | 1,724,239 | 1.34 |
| Wisconsin | 1 | 120 | 0 | 8,287 | 60 | 4,972 | 26,103 | 5.25 |
| Wyoming | 1 | 74 | 0 | 10,240 | 47.8 | 4,895 | 17,133 | 3.50 |
| Total | 265 | 45,565 | 638 | 20,848,323 | 64 | 13,333,714 | 19,234,319 | 1.44 |

*a* Includes Utah's production of coal and coke and value of same.
*b* Includes 36 gas retorts.
*c* Included with Colorado's coke production.

The increases and decreases in the several States during 1897, as compared with 1896, are shown in the following table:

*Increases and decreases in coke production, by States, in 1897 as compared with 1896.*

| State or Territory. | Increase. | | Decrease. | |
|---|---|---|---|---|
| | Amount of increase. | Per cent of increase. | Amount of decrease. | Per cent of decrease. |
| | *Short tons.* | | *Short tons.* | |
| Alabama | ..... | ..... | 36,420 | 2.5 |
| Colorado (*a*) | ..... | ..... | 21,107 | 6 |
| Georgia | ..... | ..... | 20,673 | 38.5 |
| Illinois | ..... | ..... | 1,051 | 40.4 |
| Indiana | ..... | ..... | 1,449 | 33.3 |
| Indian Territory | 9,343 | 44.4 | ..... | ..... |
| Kansas | 1,396 | 29.2 | ..... | ..... |
| Kentucky | 5,010 | 18.5 | ..... | ..... |
| Missouri | 93 | 3.7 | ..... | ..... |
| Montana | 7,771 | 12.9 | ..... | ..... |
| New Mexico | ..... | ..... | 22,790 | 94 |
| Ohio | 14,219 | 17.6 | ..... | ..... |
| Pennsylvania and New York | 1,610,422 | 21.9 | ..... | ..... |
| Tennessee | 29,567 | 8.7 | ..... | ..... |
| Texas | 394 | 100 | ..... | ..... |
| Virginia | 85,986 | 32.1 | ..... | ..... |
| Washington | 240 | .9 | ..... | ..... |
| West Virginia | ..... | ..... | 177,089 | 10.7 |
| Wisconsin | 11,884 | 222.9 | ..... | ..... |
| Wyoming | 4,465 | 22.8 | ..... | ..... |
| Total | 1,500,211 | 12.7 | ..... | ..... |

*a* Including Utah.

The above table shows that the net increase in the production of coke in 1897 was 1,500,211 short tons. The net decrease in 1896 was 1,544,941 short tons, so that the product in 1897 was still 44,730 short tons less than that of 1895.

In the following table are consolidated the statistics of the manufacture of coke in the United States from 1880 to 1897 inclusive:

*Statistics of the manufacture of coke in the United States, 1880 to 1897, inclusive.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per ct.* |
| 1880.. | 186 | 12,372 | 1,159 | 5,237,741 | 3,338,300 | $6,631,267 | $1.99 | 63 |
| 1881.. | 197 | 14,119 | 1,005 | 6,546,662 | 4,113,760 | 7,725,175 | 1.88 | 63 |
| 1882.. | 215 | 16,356 | 712 | 7,577,648 | 4,793,321 | 8,462,167 | 1.77 | 63 |
| 1883.. | 231 | 18,304 | 407 | 8,516,670 | 5,464,721 | 8,121,607 | 1.49 | 64 |
| 1884.. | 250 | 19,557 | 812 | 7,951,974 | 4,873,805 | 7,242,878 | 1.49 | 61 |
| 1885.. | 233 | 20,116 | 432 | 8,071,126 | 5,106,696 | 7,629,118 | 1.49 | 63 |
| 1886.. | 222 | 22,597 | 4,154 | 10,688,972 | 6,845,369 | 11,153,366 | 1.63 | 64 |
| 1887.. | 270 | 26,001 | 3,584 | 11,859,752 | 7,611,705 | 15,321,116 | 2.01 | 64 |
| 1888.. | 261 | 30,059 | 2,587 | 12,945,350 | 8,540,030 | 12,445,963 | 1.46 | 66 |
| 1889.. | 252 | 34,165 | 2,115 | 15,960,973 | 10,258,022 | 16,630,301 | 1.62 | 64 |
| 1890.. | 253 | 37,158 | 1,547 | 18,005,209 | 11,508,021 | 23,215,302 | 2.02 | 64 |
| 1891.. | 243 | 40,245 | 911 | 16,344,540 | 10,352,688 | 20,323,216 | 1.97 | 63 |
| 1892.. | 261 | 42,002 | 1,893 | 18,813,337 | 12,010,829 | 23,536,141 | 1.96 | 64 |
| 1893.. | 258 | 44,201 | 717 | 14,917,146 | 9,477,580 | 16,523,714 | 1.74 | 63.5 |
| 1894.. | 260 | 44,772 | 591 | [a]14,348,750 | 9,203,632 | [a]12,328,856 | 1.34 | 64 |
| 1895.. | 265 | 45,565 | 638 | 20,848,323 | 13,333,714 | [b]19,234,319 | 1.44 | 64 |
| 1896.. | 341 | 46,944 | 383 | 18,694,422 | 11,788,773 | 21,660,729 | 1.837 | 63 |
| 1897.. | 336 | 47,668 | 575 | 20,907,319 | 13,288,984 | 22,102,514 | 1.663 | 63.5 |

[a] Excluding New York. [b] Excluding New York and Texas.

## TOTAL NUMBER OF COKE WORKS IN THE UNITED STATES.

The following table gives the number of establishments manufacturing coke in the United States at the close of each year from 1880 to 1896, by States. According to this table the number of establishments in the last two years has largely increased. The increase is only apparent. In previous reports it has been customary to include under one establishment all coke works reported from one general office, and to consider them separate establishments when reported individually from the central office. In the statistics for 1896 the word establishment is used to designate the number of ovens or banks of ovens which were in operation, whether reported from one office or not. When one company reported production at two or more banks of ovens, each is considered a separate establishment.

*Number of establishments in the United States manufacturing coke on December 31 of each year from 1880 to 1897.*

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 4 | 4 | 5 | 6 | 8 | 11 | 14 | 15 | 18 |
| Colorado | 1 | 2 | 5 | 7 | 8 | 7 | 7 | 7 | 7 |
| Georgia | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |
| Illinois | 6 | 6 | 7 | 7 | 9 | 9 | 9 | 8 | 8 |
| Indiana | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 3 |
| Indian Territory | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Kansas | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 6 |
| Kentucky | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 10 |
| Missouri | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Montana | 0 | 0 | 0 | 1 | 3 | 2 | 4 | 2 | 1 |
| New Mexico | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| Ohio | 15 | 15 | 16 | 18 | 19 | 13 | 15 | 15 | 15 |
| Pennsylvania | 124 | 132 | 137 | 140 | 145 | 133 | 108 | 151 | 120 |
| Tennessee | 6 | 6 | 8 | 11 | 13 | 12 | 12 | 11 | 11 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Utah | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| Virginia | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 2 |
| Washington | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 3 |
| West Virginia | 18 | 19 | 22 | 24 | 27 | 27 | 29 | 39 | 52 |
| Wisconsin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 186 | 197 | 215 | 231 | 250 | 233 | 222 | 270 | 261 |

| State or Territory. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 19 | 20 | 21 | 20 | 23 | 22 | 22 | 24 | 25 |
| Colorado | 9 | 8 | 7 | 9 | 8 | 8 | 9 | 11 | 12 |
| Georgia | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Illinois | 4 | 4 | 1 | 1 | 1 | 1 | 3 | 3 | 2 |
| Indiana | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Indian Territory | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| Kansas | 6 | 7 | 6 | 6 | 6 | 6 | 5 | 6 | 4 |
| Kentucky | 9 | 9 | 7 | 5 | 4 | 6 | 5 | 4 | 5 |
| Missouri | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Montana | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| New Mexico | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| New York | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| Ohio | 13 | 13 | 9 | 10 | 9 | 8 | 8 | 9 | 9 |
| Pennsylvania | 109 | 106 | 109 | 109 | 102 | 101 | 99 | 158 | 153 |
| Tennessee | 12 | 11 | 11 | 11 | 11 | 11 | 12 | 15 | 15 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| Utah | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Virginia | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 7 | 6 |
| Washington | 1 | 5 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| West Virginia | 53 | 55 | 55 | 72 | 75 | 78 | 78 | 84 | 84 |
| Wisconsin | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Wyoming | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total | 253 | 253 | 243 | 261 | 258 | 260 | 265 | 341 | 336 |

The number of establishments in the country for each year since 1850 for which there are any returns is as follows:

*Number of coke establishments in the United States since 1850.*

| Year. | Number. | Year. | Number. |
|---|---|---|---|
| 1850 (census year) | 4 | 1887, December 31 | 270 |
| 1860 (census year) | 21 | 1888, December 31 | 261 |
| 1870 (census year) | 25 | 1889, December 31 | 253 |
| 1880 (census year) | 149 | 1890, December 31 | 253 |
| 1880, December 31 | 186 | 1891, December 31 | 243 |
| 1881, December 31 | 197 | 1892, December 31 | 261 |
| 1882, December 31 | 215 | 1893, December 31 | 258 |
| 1883, December 31 | 231 | 1894, December 31 | 260 |
| 1884, December 31 | 250 | 1895, December 31 | 265 |
| 1885, December 31 | 233 | 1896, December 31 | 341 |
| 1886, December 31 | 222 | 1897, December 31 | 336 |

The foregoing table, taken in connection with the statistics presented in the succeeding paragraph giving the number of coke ovens in the United States, presents some interesting facts. From them it appears that on December 31, 1880, the number of coke establishments in the United States was 186 and the number of coke ovens 12,372, being equivalent to an average of 66.5 ovens to each establishment. Five years later, in 1885, there were 233 establishments and 20,116 ovens, an average of 86.3 to each establishment. In 1890 there were 253 establishments with a total of 37,158 ovens, an average of 147 ovens to an establishment. In 1895 there were 265 establishments and 45,565 ovens, an average of 172 ovens to an establishment, while in 1897, if we take the number of establishments upon the same basis as obtained prior to 1896, there were 264 establishments with a total of 47,788 ovens, an average of 181 ovens to each establishment. This statement presents another illustration of the tendency toward consolidation of large industries under one management. In the eighteen years from 1880 to 1897 inclusive the number of establishments has increased from 186 to 264, an increase of 42 per cent. The number of coke ovens has increased from 12, 372 to 47,788, a gain of 35,416 ovens, or 286 per cent, and the average number of ovens to an establishment has increased from 66.5 to 181, a gain of 172 per cent.

Considering each bank of ovens as a separate establishment, as has been done in the reports for 1896 and 1897, the number of establishments has decreased from 341 to 336, while the total number of coke ovens has increased from 46,944 to 47,788, the average number of ovens to an establishment being 138 in 1896 and 142 in 1897.

## NUMBER OF COKE OVENS IN THE UNITED STATES.

The following table shows the number of coke ovens in each State and Territory on December 31 of each year from 1880 to 1897, together with the total number of ovens in the United States at the close of each of these years. In the earlier years covered by this table some coke was made in pits and on the ground, and in testing the adaptability of certain coals to the manufacture of coke this is still customary, though in the latter years but little of the coke reported as produced in the United States was made by any other method than in ovens. The statistics for 1896 show an interesting increase in the number of by-product ovens built. The first by-product ovens to be used in the United States were 12 Semet-Solvay ovens erected in New York. Two years later 60 Otto-Hoffmann ovens were built in Pennsylvania. The returns for 1896 show 13 Semet-Solvay ovens added to the plant in New York; 75 of the same design were built in Pennsylvania, and the latter State has also added 30 Newton-Chambers ovens and 3 Slocum ovens to her coke-making plants.

In 1897 120 Otto-Hoffmann ovens have been added to those already built in Pennsylvania, and 400 more of the same ovens were in course of construction near Boston, Mass., at the time of writing this report, with 800 more contemplated. The close of 1897 finds also 120 Semet-Solvay ovens in course of construction in Alabama.

*Number of coke ovens in the United States on December 31 of each year from 1880 to 1897.*

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 316 | 416 | 536 | 767 | 976 | 1,075 | 1,301 | 1,555 | 2,475 |
| Colorado | 200 | 267 | 344 | 352 | 409 | 434 | 483 | 532 | 602 |
| Georgia | 140 | 180 | 220 | 264 | 300 | 300 | 300 | 300 | 290 |
| Illinois | 176 | 176 | 304 | 316 | 325 | 320 | 335 | 278 | 221 |
| Indiana | 45 | 45 | 37 | 37 | 37 | 37 | 100 | 119 | 103 |
| Indian Ter | 20 | 20 | 20 | 20 | 20 | 40 | 40 | 80 | 80 |
| Kansas | 6 | 15 | 20 | 23 | 23 | 23 | 36 | 39 | 58 |
| Kentucky | 45 | 45 | 45 | 45 | 45 | 33 | 76 | 98 | 132 |
| Missouri | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| Montana | 0 | 0 | 0 | 2 | 5 | 2 | 16 | 27 | 40 |
| New Mexico | 0 | 0 | 0 | 12 | 70 | 70 | 70 | 70 | 70 |
| New York | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ohio | 616 | 641 | 647 | 682 | 732 | 642 | 560 | 585 | 547 |
| Pennsylvania | 9,501 | 10,881 | 12,424 | 13,610 | 14,285 | 14,553 | 16,314 | 18,294 | 20,381 |
| Tennessee | 656 | 724 | 861 | 992 | 1,105 | 1,387 | 1,485 | 1,560 | 1,634 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Utah | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 0 | 0 |
| Virginia | 0 | 0 | 0 | 200 | 200 | 200 | 350 | 350 | 550 |
| Washington | 0 | 0 | 0 | 0 | 0 | 2 | 11 | 30 | 30 |
| West Virginia | 631 | 689 | 878 | 962 | 1,005 | 978 | 1,100 | 2,080 | 2,792 |
| Wisconsin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 12,372 | 14,119 | 16,356 | 18,304 | 19,557 | 20,116 | 22,597 | 26,001 | 30,059 |

*Number of coke ovens in the United States on December 31 of each year from 1880 to 1897*—Continued.

| State or Territory. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 3,944 | 4,805 | 5,068 | 5,320 | 5,548 | 5,551 | 5,658 | 5,363 | 5,365 |
| Colorado | 834 | 916 | 948 | a1,128 | a1,154 | a1,154 | a1,169 | a1,275 | a1,273 |
| Georgia | 300 | 300 | 300 | 300 | 338 | 338 | 330 | 334 | 300 |
| Illinois | 149 | 148 | 25 | 24 | 24 | 24 | 129 | 127 | 126 |
| Indiana | 111 | 101 | 84 | 84 | 94 | 94 | 94 | 94 | 94 |
| Indian Ter | 78 | 78 | 80 | 80 | 80 | 80 | 80 | 130 | 130 |
| Kansas | 68 | 68 | 72 | 75 | 75 | 61 | 55 | 55 | 57 |
| Kentucky | 166 | 175 | 115 | 287 | 283 | 293 | 293 | 264 | 268 |
| Missouri | 9 | 10 | 10 | 10 | 10 | 10 | 10 | 7 | 15 |
| Montana | 90 | 140 | 140 | 153 | 153 | 153 | 303 | 303 | 303 |
| New Mexico | 70 | 70 | b0 | 50 | 50 | 50 | 50 | 50 | 126 |
| New York | 0 | 0 | 0 | 0 | c12 | c12 | c12 | c25 | c25 |
| Ohio | 462 | 443 | 421 | 436 | 435 | 363 | 377 | 431 | 433 |
| Pennsylvania | 22,143 | 23,430 | 25,324 | 25,366 | 25,744 | 25,824 | d26,042 | d26,658 | e26,910 |
| Tennessee | 1,639 | 1,664 | 1,995 | 1,941 | 1,942 | 1,860 | 1,903 | 1,861 | 1,948 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 60 | 20 |
| Utah | 34 | 80 | 80 | 83 | 83 | 83 | 84 | 104 | 104 |
| Virginia | 550 | 550 | 550 | 594 | 594 | 736 | 832 | 1,138 | 1,453 |
| Washington | 30 | 30 | 80 | 84 | 84 | 84 | 110 | 120 | 120 |
| West Virginia | 3,438 | 4,060 | 4,621 | 5,843 | 7,354 | 7,858 | 7,834 | 8,351 | 8,404 |
| Wisconsin | 50 | 70 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| Wyoming | 0 | 20 | 24 | 24 | 24 | 24 | 74 | 74 | 74 |
| Total | 34,165 | 37,158 | 40,057 | 42,002 | 44,201 | 44,772 | 45,565 | 46,944 | 47,668 |

*a* Includes 36 gas retorts.
*b* Coke was made in pits.
*c* Semet-Solvay ovens.
*d* Includes 60 Otto-Hoffmann ovens, 75 Semet-Solvay ovens, 30 Newton-Chambers ovens, and 3 Slocum ovens.
*e* Includes 180 Otto-Hoffmann ovens, 75 Semet-Solvay ovens, 30 Newton-Chambers ovens, and 3 Slocum ovens.

From the above table it will be seen that the number of coke ovens in existence at the close of 1897 was 47,668, against 46,944 at the close of 1896. While this shows a substantial increase, it was not in proportion to the increase in the production of coke, as is shown by the fact that in 1896 the average output per oven was 251 short tons, while in 1897 it was 279 tons. The average production per oven in 1895 was 292 tons, so that while the capacity per oven in 1897 was about 10 per cent greater than it was in 1896, it was 5 per cent less than in 1895. Among the more important producing States the greatest amount of activity was at the coke ovens of Pennsylvania, where the average production of coke per oven in 1897 was 333 tons, against 275 tons in 1896 and 361 tons in 1895. The number of coke ovens in existence in Pennsylvania during 1897 was 26,910, equivalent to 56.6 per

cent of the total number of ovens in the United States, while the production of coke in the State was 67.5 per cent of the total output. West Virginia had 8,404 ovens in existence in 1897, an increase of 53 over 1896. The output of coke was 1,472,666 tons, an average annual production per oven of 175 tons—a decrease from an average of 199 tons in 1896. Alabama, with 5,365 ovens, produced 1,443,017 tons, an average of 269 tons per oven, against 275 tons in 1896 and 255 tons in 1895. Tennessee, with a total of 1,948 ovens, produced 368,769 tons of coke, an average per oven of 189, against 182 tons in 1896. The average output per oven in Virginia was 244 tons in 1897 and 240 tons in 1896. Colorado had an average of 269 tons in 1897, against 285 tons in 1896. It will be seen from this that, in addition to Pennsylvania, there was an increased activity during 1897 in Tennessee and Virginia and a decreased activity in West Virginia, Alabama, and Colorado.

Most of the coke ovens in the United States are of the solid-wall type, in which coal is coked by heat generated in the oven itself. Most of these ovens are of the regular beehive shape. A few are somewhat modified in form, the oven being long and shaped like a muffle. Other ovens, while they retain the beehive form, have hollow tiles near the top, into which the air, previously heated, enters for combustion. As stated before, the use of by-product ovens is increasing, and it may not be very long before coke manufacturers will become convinced that the greatest economy in coke making is not to be accomplished by saving on the first cost. One hundred and eight by-product ovens were built in 1896, and 120 more were added to the total number in 1897, while on December 31, 1897, 120 by-product ovens of the Semet-Solvay type were building in Alabama and plans for building 400 Otto-Hoffmann ovens near Boston, Mass., were completed. These 400 ovens will probably be in operation before the close of 1898.

### NUMBER OF OVENS BUILDING IN THE UNITED STATES.

The following table gives the number of ovens actually in course of construction at the close of each year from 1880 to 1897. It should be understood that this table does not include the increase in the number of ovens during the year. It only gives the number of ovens actually in course of construction at the close of each year. It will be noted that the number in course of erection at the close of 1897 was 575.

*Number of coke ovens building in the United States at the close of each year from 1880 to 1897.*

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 100 | 120 | 0 | 122 | 242 | 16 | 1,012 | 1,362 | 406 |
| Colorado | 50 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 100 |
| Georgia | 40 | 40 | 44 | 36 | 0 | 0 | 0 | 0 | 0 |
| Illinois | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indiana | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 |
| Indian Territory | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kansas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kentucky | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Missouri | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montana | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 |
| New Mexico | 0 | 0 | 12 | 28 | 0 | 0 | 0 | 0 | 0 |
| New York | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ohio | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 223 | 12 |
| Pennsylvania | 836 | 761 | 642 | 211 | 232 | 317 | 2,558 | 802 | 1,565 |
| Tennessee | 68 | 84 | 14 | 10 | 175 | 36 | 126 | 165 | 84 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 300 | 0 |
| Washington | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 100 |
| West Virginia | 40 | 0 | 0 | 0 | 127 | 63 | 317 | 742 | 318 |
| Wisconsin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1,159 | 1,005 | 712 | 407 | 812 | 432 | 4,154 | 3,594 | 2,587 |

| State or Territory. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 427 | 371 | 50 | 90 | 60 | 50 | 50 | 0 | *a* 120 |
| Colorado | 50 | 30 | 21 | 220 | 200 | 250 | 0 | 0 | 0 |
| Georgia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Illinois | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indiana | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indian Territory | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kansas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kentucky | 100 | 303 | 24 | 100 | 100 | 0 | 0 | 0 | 0 |
| Missouri | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montana | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Mexico | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New York | 0 | 0 | 0 | 0 | 0 | *a* 13 | *a* 13 | 0 | 0 |
| Ohio | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pennsylvania | 567 | 74 | 11 | 269 | 19 | 118 | *b* 170 | *c* 154 | 307 |
| Tennessee | 40 | 292 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia | 250 | 250 | 250 | 206 | 206 | 100 | 350 | 101 | 110 |
| Washington | 0 | 80 | 0 | 30 | 0 | 0 | 0 | 0 | 0 |
| West Virginia | 631 | 334 | 555 | 978 | 132 | 60 | 55 | 28 | 38 |
| Wisconsin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 2,115 | 1,735 | 911 | 1,893 | 717 | 591 | 638 | 383 | 575 |

*a* Semet-Solvay.
*b* Includes 60 Otto-Hoffmann and 50 Semet-Solvay ovens.
*c* Includes 120 Otto-Hoffmann ovens.

*Amount of coke produced, in short tons, in the United States, etc.*—Continued.

| State or Territory. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|---|
| New York | 0 | 0 | 0 | 0 | 0 | 0 |
| Ohio | 34,932 | 93,004 | 67,194 | 75,124 | 74,633 | 38,718 |
| Pennsylvania | 5,406,597 | 5,832,849 | 6,545,779 | 7,659,055 | 8,560,245 | 6,954,846 |
| Tennessee | 368,139 | 396,979 | 385,693 | 359,710 | 348,728 | 364,318 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 |
| Utah | 0 | 0 | 0 | 761 | 8,528 | 7,949 |
| Virginia | 122,352 | 166,947 | 149,199 | 146,528 | 165,847 | 167,516 |
| Washington | 825 | 14,625 | 0 | 3,841 | 5,837 | 6,000 |
| West Virginia | 264,158 | 442,031 | 531,762 | 607,880 | 833,377 | 1,009,051 |
| Wisconsin | 0 | 0 | 500 | 16,016 | 24,976 | 34,387 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 2,682 |
| Total | 6,845,369 | 7,611,705 | 8,540,030 | 10,258,022 | 11,508,021 | 10,352,688 |

| State or Territory. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| Alabama | 1,501,571 | 1,168,085 | 923,817 | 1,444,339 | 1,479,437 | 1,443,017 |
| Colorado | 365,920 | 346,981 | 301,140 | 317,838 | 343,313 | 319,036 |
| Georgia | 81,807 | 90,726 | 92,029 | 60,212 | 53,673 | 33,000 |
| Illinois | 3,170 | 2,200 | 2,200 | 2,250 | 2,600 | 1,549 |
| Indiana | 2,207 | 5,724 | 6,551 | 4,804 | 4,353 | 2,904 |
| Indian Territory | 3,569 | 7,135 | 3,051 | 5,175 | 21,021 | 30,364 |
| Kansas | 9,132 | 8,565 | 8,439 | 5,287 | 4,785 | 6,181 |
| Kentucky | 36,123 | 48,619 | 29,748 | 25,460 | 27,107 | 32,117 |
| Missouri | 7,299 | 5,905 | 2,250 | 2,028 | 2,500 | 2,593 |
| Montana | 34,557 | 29,945 | 17,388 | 25,337 | 60,078 | 67,849 |
| New Mexico | 0 | 5,803 | 6,529 | 14,663 | 24,228 | 1,438 |
| New York | 0 | 12,850 | 16,500 | 18,521 | (*a*) | (*a*) |
| Ohio | 51,818 | 22,436 | 32,640 | 29,050 | 80,868 | 95,087 |
| Pennsylvania | 8,327,612 | 6,229,051 | 6,063,777 | 9,404,215 | *b*7,356,502 | *b* 8,966,924 |
| Tennessee | 354,096 | 265,777 | 292,646 | 396,790 | 339,202 | 368,769 |
| Texas | 0 | 0 | 0 | 286 | 0 | 394 |
| Utah | 7,309 | 16,005 | 16,056 | 22,519 | 20,447 | 23,617 |
| Virginia | 147,912 | 125,092 | 180,091 | 244,738 | 268,081 | 354,067 |
| Washington | 7,177 | 6,731 | 5,245 | 15,129 | 25,949 | 26,189 |
| West Virginia | 1,034,750 | 1,062,076 | 1,193,933 | 1,285,206 | 1,649,755 | 1,472,666 |
| Wisconsin | 33,800 | 14,958 | 4,250 | 4,972 | 5,332 | 17,216 |
| Wyoming | 0 | 2,916 | 4,352 | 4,895 | 19,542 | 24,007 |
| Total | 12,010,829 | 9,477,580 | 9,203,632 | 13,333,714 | 11,788,773 | 13,288,984 |

*a* Included with Pennsylvania. *b* Includes production of New York.

## RANK OF COKE-PRODUCING STATES.

The following table gives the relative rank of the States and Territories in the production of coke from 1880 to 1897, inclusive:

*Rank of the States and Territories in production of coke from 1880 to 1897.*

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. |
|---|---|---|---|---|---|---|---|---|---|
| Pennsylvania | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| West Virginia | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 2 | 2 |
| Alabama | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 4 | 3 |
| Colorado | 7 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 |
| Tennessee | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 |
| Virginia | ..... | ..... | ..... | 8 | 7 | 7 | 6 | 6 | 6 |
| Ohio | 4 | 4 | 5 | 6 | 8 | 8 | 8 | 7 | 8 |
| Montana | ..... | ..... | ..... | ..... | 15 | 15 | ..... | 16 | 12 |
| Georgia | 6 | 7 | 7 | 7 | 6 | 6 | 7 | 8 | 7 |
| Kentucky | 9 | 10 | 10 | 11 | 12 | 13 | 14 | 12 | 9 |
| Washington | ..... | ..... | ..... | ..... | 14 | 14 | 15 | 11 | 10 |
| New Mexico | ..... | ..... | 12 | 12 | 9 | 9 | 10 | 13 | 14 |
| Indian Territory | 11 | 11 | 11 | 13 | 13 | 12 | 12 | 14 | 15 |
| Utah | 12 | ..... | 13 | ..... | ..... | ..... | ..... | ..... | ..... |
| Wisconsin | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 18 |
| Kansas | 10 | 9 | 9 | 10 | 11 | 11 | 9 | 10 | 11 |
| Indiana | ..... | ..... | ..... | ..... | ..... | ..... | 13 | 9 | 13 |
| Illinois | 8 | 8 | 8 | 9 | 10 | 10 | 11 | 15 | 16 |
| Missouri | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 17 | 17 |
| Texas | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

| State or Territory. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Pennsylvania | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| West Virginia | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 |
| Alabama | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 |
| Tennessee | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 4 |
| Virginia | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 |
| Colorado | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 6 |
| Ohio | 8 | 8 | 8 | 8 | 10 | 8 | 8 | 7 | 7 |
| Montana | 10 | 10 | 11 | 10 | 9 | 10 | 10 | 8 | 8 |
| Georgia | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 9 | 9 |
| Kentucky | 12 | 11 | 10 | 9 | 8 | 9 | 9 | 10 | 10 |
| Indian Territory | 15 | 14 | 13 | 16 | 15 | 19 | 16 | 13 | 11 |
| New York | ..... | ..... | ..... | ..... | 13 | 11 | 12 | 16 | 12 |
| Washington | 17 | 17 | 16 | 15 | 16 | 16 | 13 | 11 | 13 |
| Wyoming | ..... | ..... | 19 | ..... | 20 | 17 | 18 | 15 | 14 |
| Utah | 19 | 13 | 14 | 13 | 11 | 12 | 11 | 14 | 15 |
| Wisconsin | 9 | 9 | 9 | 11 | 12 | 18 | 17 | 17 | 16 |
| Kansas | 11 | 12 | 12 | 12 | 14 | 13 | 15 | 18 | 17 |
| Indiana | 14 | 16 | 18 | 17 | 19 | 14 | 19 | 19 | 18 |
| Missouri | 16 | 15 | 15 | 14 | 17 | 20 | 21 | 21 | 19 |
| Illinois | 13 | 18 | 17 | 18 | 21 | 21 | 20 | 20 | 20 |
| New Mexico | 18 | 19 | 20 | ..... | 18 | 15 | 14 | 12 | 21 |
| Texas | ..... | ..... | ..... | ..... | ..... | ..... | 22 | 22 | 22 |

An inspection of the foregoing table shows that the same six States, Pennsylvania, West Virginia, Alabama, Colorado, Tennessee, and Virginia, have remained at the head of the list since 1886, but, with the exception of Pennsylvania, which stands preeminently and permanently in first place, their relative ranks have changed frequently. West Virginia and Alabama have been rivals for second place on the list ever since the latter State took third position in 1883. Nine times since then Alabama has held second place, while West Virginia has taken it six times. Colorado and Tennessee have been similar rivals for fourth place, Colorado holding it four times and Tennessee six times since 1887. Colorado dropped from the fourth place in 1896 to sixth place in 1897, Tennessee taking its place, and Virginia, which has held sixth place consistently since 1886, became fifth in importance as a coke producer. The most pronounced changes that occurred in 1897 were the advances of Indian Territory and New York from thirteenth and sixteenth places to eleventh and twelfth, respectively, and the fall of New Mexico from twelfth place to twenty-first.

## VALUE AND AVERAGE SELLING PRICE OF COKE.

In the following table is given the total value of coke produced in the United States in each year from 1880 to 1897, inclusive:

*Total value at the ovens of the coke made in the United States in the years from 1880 to 1897, inclusive, by States and Territories.*

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. |
|---|---|---|---|---|---|---|
| Alabama | $183,063 | $326,819 | $425,940 | $598,473 | $609,185 | $755,645 |
| Colorado | 145,226 | 267,156 | 476,665 | 584,578 | 409,930 | 512,162 |
| Georgia | 81,789 | 88,753 | 100,194 | 147,166 | 169,192 | 144,198 |
| Illinois | 41,950 | 45,850 | 29,050 | 28,200 | 25,639 | 27,798 |
| Indiana | 0 | 0 | 0 | 0 | 0 | 0 |
| Indian Territory | 4,638 | 5,304 | 6,075 | 7,719 | 5,736 | 12,902 |
| Kansas | 6,000 | 10,200 | 11,460 | 16,560 | 14,580 | 13,255 |
| Kentucky | 12,250 | 12,630 | 11,530 | 14,425 | 8,760 | 8,499 |
| Missouri | 0 | 0 | 0 | 0 | 0 | 0 |
| Montana | 0 | 0 | 0 | 0 | 900 | 2,063 |
| New Mexico | 0 | 0 | 6,000 | 21,478 | 91,410 | 89,700 |
| New York | 0 | 0 | 0 | 0 | 0 | 0 |
| Ohio | 255,905 | 297,728 | 266,113 | 225,660 | 156,294 | 109,723 |
| Pennsylvania | 5,255,040 | 5,898,579 | 6,133,698 | 5,410,387 | 4,783,230 | 4,981,656 |
| Tennessee | 316,607 | 342,585 | 472,505 | 459,126 | 428,870 | 398,459 |
| Utah | 10,000 | 0 | 2,500 | 0 | 0 | 0 |
| Virginia | 0 | 0 | 0 | 44,345 | 111,300 | 85,993 |
| Washington | 0 | 0 | 0 | 0 | 1,900 | 1,477 |
| West Virginia | 318,797 | 429,571 | 520,437 | 563,490 | 425,952 | 485,588 |
| Wisconsin | 0 | 0 | 0 | 0 | 0 | 0 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 6,631,265 | 7,725,175 | 8,462,167 | 8,121,607 | 7,242,878 | 7,629,118 |

*Total value at the ovens of the coke made in the United States, etc.*—Continued.

| State or Territory. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|---|
| Alabama | $993,302 | $775,090 | $1,189,679 | $2,372,417 | $2,589,447 | $2,986,242 |
| Colorado | 569,120 | 682,778 | 716,305 | 643,479 | 959,246 | 896,984 |
| Georgia | 179,031 | 174,410 | 177,907 | 149,059 | 150,995 | 231,878 |
| Illinois | 21,487 | 19,594 | 21,038 | 29,764 | 11,250 | 11,700 |
| Indiana | 17,953 | 51,141 | 31,993 | 25,922 | 19,706 | 7,596 |
| Indian Territory | 22,229 | 33,435 | 21,755 | 17,957 | 21,577 | 30,483 |
| Kansas | 19,204 | 28,575 | 29,073 | 26,593 | 29,116 | 33,296 |
| Kentucky | 10,082 | 31,730 | 47,244 | 29,769 | 22,191 | 68,281 |
| Missouri | 0 | 10,395 | 9,100 | 5,800 | 9,240 | 10,000 |
| Montana | 0 | 72,000 | 96,000 | 122,023 | 125,655 | 258,523 |
| New Mexico | 51,180 | 82,260 | 51,240 | 18,408 | 10,025 | 10,925 |
| New York | 0 | 0 | 0 | 0 | 0 | 0 |
| Ohio | 94,042 | 245,981 | 166,330 | 188,222 | 218,090 | 76,901 |
| Pennsylvania | 7,664,023 | 10,746,352 | 8,230,759 | 10,743,492 | 16,333,674 | 12,679,826 |
| Tennessee | 687,865 | 870,900 | 490,491 | 731,496 | 684,116 | 701,803 |
| Utah | 0 | 0 | 0 | 3,042 | 37,196 | 35,778 |
| Virginia | 305,880 | 417,368 | 260,000 | 325,861 | 278,724 | 265,107 |
| Washington | 4,125 | 102,375 | 0 | 30,728 | 46,696 | 42,000 |
| West Virginia | 513,843 | 976,732 | 905,549 | 1,074,177 | 1,524,746 | 1,845,043 |
| Wisconsin | 0 | 0 | 1,500 | 92,092 | 143,612 | 192,804 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 8,046 |
| Total | 11,153,366 | 15,321,116 | 12,445,963 | 16,630,301 | 23,215,302 | 20,393,216 |

| State or Territory. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| Alabama | $3,464,623 | $2,648,632 | $1,871,348 | $3,033,521 | $3,064,960 | $3,094,461 |
| Colorado | a 1,234,320 | a 1,137,488 | a 903,970 | a 940,987 | a 1,046,306 | a 999,216 |
| Georgia | 163,614 | 136,089 | 116,286 | 70,580 | 68,486 | 42,240 |
| Illinois | 7,133 | 4,400 | 4,400 | 4,500 | 5,200 | 2,895 |
| Indiana | 6,472 | 9,048 | 13,102 | 9,333 | 8,647 | 5,795 |
| Indian Territory | 12,402 | 25,072 | 10,693 | 17,657 | 73,574 | 104,725 |
| Kansas | 19,906 | 18,640 | 15,660 | 11,289 | 8,676 | 9,272 |
| Kentucky | 72,563 | 97,350 | 51,566 | 37,249 | 42,062 | 45,454 |
| Missouri | 10,949 | 9,735 | 3,563 | 2,442 | 4,131 | 3,890 |
| Montana | 311,013 | 239,560 | 165,187 | 189,856 | 425,483 | 467,481 |
| New Mexico | 0 | 18,476 | 28,213 | 29,491 | 48,453 | 3,232 |
| New York | 0 | 35,925 | ..... | ..... | (b) | (b) |
| Ohio | 112,907 | 43,671 | 90,875 | 69,655 | 208,789 | 235,784 |
| Pennsylvania | 15,015,336 | 9,468,036 | 6,585,489 | 11,908,162 | c13,182,859 | c13,727,966 |
| Tennessee | 724,106 | 491,523 | 480,124 | 754,926 | 624,011 | 667,656 |
| Utah | (d) | (d) | (d) | (d) | (d) | (d) |
| Virginia | 322,486 | 282,898 | 295,747 | 322,564 | 404,573 | 495,864 |
| Washington | 50,446 | 34,207 | 18,249 | 64,632 | 104,894 | 115,754 |
| West Virginia | 1,821,965 | 1,716,907 | 1,639,687 | 1,724,239 | 2,259,999 | 1,933,808 |
| Wisconsin | 185,900 | 95,851 | 19,465 | 26,103 | 21,000 | 75,000 |
| Wyoming | 0 | 10,206 | 15,232 | 17,133 | 58,626 | 72,021 |
| Total | 23,536,141 | 16,523,714 | 12,328,856 | 19,234,319 | 21,660,729 | 22,102,514 |

*a* Includes value of Utah coke.
*b* Included with Pennsylvania.
*c* Includes value of New York coke.
*d* Included with Colorado.

While this table gives the totals of the value as returned in the schedules, the figures do not always represent the same thing. A statement as to the actual selling price of the coke was asked for, and in most cases, including possibly 80 per cent of all the coke produced, the figures are the actual selling price. In some cases, however, the value is an estimate. Considerable of the coke made in the United States is produced by proprietors of blast furnaces for consumption in their own furnaces, none being sold. The value, therefore, given for this coke would be an estimate, based in some instances, where there are coke works in the neighborhood selling coke for the general market, upon the price obtained for this coke; in other cases the cost is estimated at the cost of the coke at the furnace, plus a small percentage for profit on the coking operation, while in still other cases the value given is only the actual cost of the coke at the ovens.

In the following table is given the average value per short ton of the coke made in the United States for each year from 1880 to 1897, inclusive, by States and Territories:

*Average value per short ton at the ovens of the coke made in the United States in the years from 1880 to 1897, inclusive, by States and Territories.*

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | $3.01 | $3.00 | $2.79 | $2.75 | $2.50 | $2.50 | $2.65 | $2.39 | $2.34 |
| Colorado | 5.68 | 5.29 | 4.67 | 4.36 | 3.45 | 3.88 | 3.99 | 4.00 | 4.00 |
| Georgia | 2.15 | 2.15 | 2.15 | 2.20 | 2.13 | 2.04 | 2.17 | 2.20 | 2.12 |
| Illinois | 3.30 | 3.10 | 2.55 | 2.10 | 1.96 | 2.68 | 2.65 | 2.13 | 2.84 |
| Indiana | ..... | ..... | ..... | ..... | ..... | ..... | 2.93 | 2.81 | 2.68 |
| Indian Territory | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.60 | 3.50 | 3.33 | 2.90 |
| Kansas | 1.95 | 1.80 | 1.70 | 1.96 | 2.02 | 1.65 | 1.54 | 1.91 | 1.96 |
| Kentucky | 2.88 | 2.89 | 2.83 | 2.87 | 3.94 | 3.14 | 2.23 | 2.18 | 2.04 |
| Missouri | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3.50 | 3.50 |
| Montana | ..... | ..... | ..... | ..... | 12.00 | 11.72 | ..... | 10.00 | 8.00 |
| New Mexico | ..... | ..... | 6.00 | 5.50 | 5.00 | 5.00 | 5.00 | 6.00 | 6.00 |
| Ohio | 2.54 | 2.49 | 2.57 | 2.57 | 2.49 | 2.78 | 2.69 | 2.65 | 2.48 |
| Pennsylvania | 1.86 | 1.70 | 1.55 | 1.22 | 1.25 | 1.25 | 1.42 | 1.84 | 1.26 |
| Tennessee | 2.42 | 2.33 | 2.52 | 2.25 | 1.95 | 1.31 | 1.87 | 2.19 | 1.27 |
| Utah | 10.00 | ..... | 10.00 | ..... | ..... | ..... | ..... | ..... | ..... |
| Virginia | ..... | ..... | ..... | 1.75 | 1.75 | 1.75 | 2.50 | 2.50 | 1.74 |
| Washington | ..... | ..... | ..... | ..... | 4.75 | 4.75 | 5.00 | 7.00 | 0 |
| West Virginia | 2.30 | 2.30 | 2.26 | 2.19 | 1.19 | 1.86 | 1.94 | 2.22 | 1.70 |
| Wisconsin | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3.00 |
| Average | 1.99 | 1.88 | 1.77 | 1.49 | 1.49 | 1.49 | 1.63 | 2.01 | 1.46 |

*Average value per short ton at the ovens of the coke made in the United States, etc.*—Cont'd.

| State or Territory. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | $2.30 | $2.41 | $2.33 | $2.31 | $2.27 | $2.025 | $2.10 | $2.07 | $2.14 |
| Colorado | 3.43 | 3.90 | 3.24 | 3.31 | *a*3.13 | *a*2.85 | *a*2.76 | *a*2.88 | *a*2.916 |
| Georgia | 1.57 | 1.48 | 2.25 | 2.00 | 1.50 | 1.25 | 1.17 | 1.276 | 1.28 |
| Illinois | 2.57 | 2.25 | 2.25 | 2.25 | 2.00 | 2.00 | 2.00 | 2.00 | 1.87 |
| Indiana | 3.12 | 3.28 | 2.00 | 2.02 | 1.58 | 2.00 | 1.94 | 1.99 | 1.995 |
| Indian Territory | 2.70 | 3.25 | 3.22 | 3.47 | 3.51 | 3.50 | 3.41 | 3.50 | 3.45 |
| Kansas | 1.91 | 2.37 | 2.35 | 2.18 | 2.18 | 1.855 | 2.14 | 1.813 | 1.50 |
| Kentucky | 2.28 | 1.80 | 2.02 | 2.01 | 2.00 | 1.73 | 1.46 | 1.55 | 1.41 |
| Missouri | 1.10 | 1.51 | 1.46 | 1.50 | 1.65 | 1.58 | 1.20 | 1.65 | 1.50 |
| Montana | 8.69 | 8.71 | 8.91 | 9.00 | 8.00 | 9.50 | 7.49 | 7.08 | 6.89 |
| New Mexico | 5.32 | 4.89 | 4.75 | 0 | 3.18 | 4.32 | 2.01 | 2.00 | 2.25 |
| New York | ..... | ..... | ..... | ..... | 2.80 | ..... | ..... | ..... | ..... |
| Ohio | 2.50 | 2.92 | 1.99 | 2.18 | 1.95 | 2.78 | 2.40 | 2.58 | 2.48 |
| Pennsylvania | 1.40 | 1.91 | 1.82 | 1.80 | 1.52 | 1.086 | 1.266 | *b*1.792 | *b*1.53 |
| Tennessee | 2.03 | 1.96 | 1.93 | 2.05 | 1.85 | 1.64 | 1.90 | 1.84 | 1.81 |
| Utah | 4.00 | 4.36 | 4.50 | 0 | ..... | ..... | ..... | ..... | ..... |
| Virginia | 2.22 | 1.68 | 1.58 | 2.18 | 2.26 | 1.64 | 1.32 | 1.509 | 1.40 |
| Washington | 8.00 | 8.00 | 7.00 | 7.03 | 5.08 | 3.48 | 4.27 | 4.04 | 4.42 |
| West Virginia | 1.76 | 1.83 | 1.83 | 1.76 | 1.62 | 1.373 | 1.34 | 1.37 | 1.31 |
| Wisconsin | 5.75 | 5.75 | 5.61 | 5.50 | 6.41 | 4.58 | 5.25 | 3.94 | 4.36 |
| Wyoming | ..... | ..... | 3.00 | 0 | 3.50 | *c*3.50 | 3.50 | 3.00 | 3.00 |
| Average | 1.62 | 2.02 | 1.97 | 1.96 | 1.74 | 1.34 | 1.44 | 1.837 | 1.663 |

*a* Average value, including Utah. *b* Average value, including New York.
*c* Value estimated.

From this table it appears that the average value per ton of coke in the United States in 1897 was practically $1.66, which, while it was about 10 per cent less than the price in 1896, was a considerable improvement over the values realized in 1894 and 1895. The exceptionally high price in 1896 was not the result of any improvement in the trade conditions, but was due to the determination on the part of the principal producers in the Connellsville region of Pennsylvania to maintain prices at a remunerative figure, a determination which was successfully carried out. The price of Connellsville furnace coke was placed early in the year at from $1.75 to $2 per ton, with foundry at $2.30 and crushed at $2.35. These prices were maintained throughout the year with the result that the output of Connellsville coke fell off from 8,181,179 tons in 1895 to 5,462,490 tons in 1896, while the total value in the latter year was only $100,000 less than that of the much larger production in 1895. The higher price of Connellsville coke in 1896 benefited competitive regions, particularly other coke fields in Pennsylvania and the New River region of West Virginia, where

increased production was shown for the year. The average price received for all kinds of coke produced in the Connellsville region in 1896 was $1.834, practically the same as the average price for the entire United States. Prices for Connellsville coke were not so strictly maintained in 1897 and the average for the region was $1.55, a decrease of 28 cents from the average for 1896. The average price for the State of Pennsylvania fell off from $1.79 in 1896 to $1.53 in 1897, and it is observed that with one or two exceptions there was a general decrease in prices throughout the United States. The exceptions were in Alabama, where the price advanced from $2.07 to $2.14, Colorado from $2.88 to $2.916, New Mexico from $2 to $2.25, Washington from $4.04 to $4.42, and Wisconsin from $3.94 to $4.36, in all of which States the increase was due to local influences.

## COAL CONSUMED IN THE MANUFACTURE OF COKE.

In the following table is given the total number of tons of coal used in the manufacture of coke in the United States for the years 1880 to 1897:

*Amount of coal used in the manufacture of coke in the United States from 1880 to 1897 inclusive, by States and Territories.*

[Short tons.]

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. |
|---|---|---|---|---|---|---|
| Alabama | 106,283 | 184,881 | 261,839 | 359,699 | 413,184 | 507,934 |
| Colorado | 51,891 | 97,508 | 180,549 | 224,089 | 181,968 | 208,069 |
| Georgia | 63,402 | 68,960 | 77,670 | 111,687 | 132,113 | 117,781 |
| Illinois | 31,240 | 35,240 | 25,270 | 31,370 | 30,168 | 21,487 |
| Indian Territory | 2,494 | 2,852 | 3,266 | 4,150 | 3,084 | 5,781 |
| Kansas | 4,800 | 8,800 | 9,200 | 13,400 | 11,500 | 15,000 |
| Kentucky | 7,206 | 7,406 | 6,006 | 8,437 | 3,451 | 5,075 |
| Montana | ..... | ..... | ..... | ..... | 165 | 300 |
| New Mexico | ..... | ..... | 1,500 | 6,941 | 29,990 | 31,889 |
| Ohio | 172,453 | 201,145 | 181,577 | 152,502 | 108,164 | 68,796 |
| Pennsylvania | 4,347,558 | 5,393,503 | 6,149,179 | 6,823,275 | 6,204,604 | 6,178,500 |
| Tennessee | 217,656 | 241,644 | 313,537 | 330,961 | 348,295 | 412,538 |
| Utah | 2,000 | ..... | 500 | ..... | ..... | ..... |
| Virginia | ..... | ..... | ..... | 39,000 | 99,000 | 81,899 |
| Washington | ..... | ..... | ..... | ..... | 700 | 544 |
| West Virginia | 230,758 | 304,823 | 366,653 | 411,159 | 385,588 | 415,533 |
| Total | 5,237,741 | 6,546,762 | 7,577,646 | 8,516,670 | 7,951,974 | 8,071,126 |

*Amount of coal used in the manufacture of coke in the United States, etc.*—Continued.

| State or Territory. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|---|
| Alabama | 635,120 | 550,047 | 858,608 | 1,746,277 | 1,809,964 | 2,144,277 |
| Colorado | 228,060 | 267,487 | 274,212 | 299,731 | 407,023 | 452,749 |
| Georgia | 136,133 | 158,482 | 140,000 | 157,878 | 170,388 | 164,875 |
| Illinois | 17,806 | 16,596 | 13,020 | 19,250 | 9,000 | 10,000 |
| Indiana | 13,030 | 35,600 | 26,547 | 16,428 | 11,753 | 8,688 |
| Indian Territory | 10,242 | 20,121 | 13,126 | 13,277 | 13,278 | 20,551 |
| Kansas | 23,062 | 27,604 | 24,934 | 21,600 | 21,809 | 27,181 |
| Kentucky | 9,055 | 29,129 | 42,642 | 25,192 | 24,372 | 64,390 |
| Missouri | ..... | 5,400 | 5,000 | 8,485 | 9,491 | 10,377 |
| Montana | ..... | 10,800 | 20,000 | 30,576 | 32,148 | 61,667 |
| New Mexico | 18,194 | 22,549 | 14,628 | 7,162 | 3,980 | 4,000 |
| New York | ..... | ..... | ..... | ..... | ..... | ..... |
| Ohio | 59,332 | 164,974 | 124,201 | 132,828 | 126,921 | 69,320 |
| Pennsylvania | 8,290,849 | 8,938,438 | 9,673,097 | 11,581,292 | 13,046,143 | 10,588,544 |
| Tennessee | 621,669 | 655,857 | 630,099 | 626,016 | 600,387 | 623,177 |
| Texas | ..... | ..... | ..... | ..... | ..... | ..... |
| Utah | ..... | ..... | ..... | 2,217 | 24,058 | 25,281 |
| Virginia | 200,018 | 235,841 | 230,529 | 238,793 | 251,683 | 285,113 |
| Washington | 1,400 | 22,500 | ..... | 6,983 | 9,120 | 10,000 |
| West Virginia | 425,002 | 698,327 | 863,707 | 1,001,372 | 1,395,266 | 1,716,976 |
| Wisconsin | ..... | ..... | 1,000 | 25,616 | 38,425 | 52,904 |
| Wyoming | ..... | ..... | ..... | ..... | ..... | 4,470 |
| Total | 10,688,972 | 11,859,752 | 12,945,350 | 15,960,973 | 18,005,209 | 16,344,540 |

| State or Territory. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|
| Alabama | 2,585,966 | 2,015,398 | 1,574,245 | 2,459,465 | 2,573,713 | 2,451,475 |
| Colorado | a599,200 | a628,935 | a542,429 | a580,584 | a639,238 | a616,592 |
| Georgia | 158,978 | 171,645 | 166,523 | 118,900 | 109,655 | 67,000 |
| Illinois | 4,800 | 3,300 | 3,800 | 3,600 | 3,900 | 3,591 |
| Indiana | 6,456 | 11,549 | 13,489 | 9,898 | 8,956 | 7,022 |
| Indian Territory | 7,138 | 15,118 | 7,274 | 11,825 | 53,028 | 68,495 |
| Kansas | 15,437 | 13,645 | 13,288 | 8,424 | 8,940 | 11,772 |
| Kentucky | 70,783 | 97,212 | 66,418 | 63,419 | 55,719 | 64,234 |
| Missouri | 11,088 | 8,875 | 3,442 | 3,120 | 4,471 | 4,627 |
| Montana | 64,412 | 61,770 | 33,313 | 55,770 | 113,165 | 139,907 |
| New Mexico | 0 | 14,698 | 13,042 | 22,385 | 39,286 | 2,585 |
| New York | ..... | 15,150 | ..... | 22,207 | (b) | (b) |
| Ohio | 95,236 | 42,963 | 55,324 | 51,921 | 128,923 | 151,545 |
| Pennsylvania | 12,591,345 | 9,386,702 | 9,059,118 | 14,211,567 | c11,124,610 | c13,538,646 |
| Tennessee | 600,126 | 449,511 | 516,802 | 684,655 | 600,379 | 667,996 |
| Texas | ..... | ..... | ..... | 530 | 0 | 700 |
| Utah | ..... | ..... | ..... | ..... | (d) | (d) |
| Virginia | 226,517 | 194,059 | 280,524 | 410,737 | 454,964 | 574,542 |
| Washington | 12,372 | 11,374 | 8,563 | 22,973 | 38,685 | 39,124 |
| West Virginia | 1,709,183 | 1,745,757 | 1,976,128 | 2,087,816 | 2,687,104 | 2,413,283 |
| Wisconsin | 54,300 | 24,085 | 6,343 | 8,287 | 8,648 | 29,207 |
| Wyoming | 0 | 5,400 | 8,685 | 10,240 | 41,038 | 54,976 |
| Total | 18,813,337 | 14,917,146 | 14,348,750 | 20,848,323 | 18,694,422 | 20,907,319 |

*a* Includes coal consumed in Utah.
*b* Included with Pennsylvania.
*c* Includes New York.
*d* Included with Colorado.

In regard to this table, it is well to repeat what has been stated in some of the previous reports. In the first place, it is to be noted that in many cases the statement as to the amount of coal used in the production of coke is an estimate. At but few works is the coal weighed before being charged into the ovens. A great deal of the coke made in the United States is from run of mine—that is, all of the product of mining, lump, nut, and slack, as it comes to the mouth of the pit in the mine car, is charged into the ovens—and if no coal is sold as coal it is comparatively easy to ascertain from the amounts paid for mining what is the amount of coal charged into the ovens. But even in such cases considerable difficulty arises, from the fact that mining is paid for by the measured bushel or ton of so many cubic feet, while our statistics are by weight, and the measured bushel or ton is often not the equivalent of the weighed bushel or ton. It is also true that in certain districts where the men are paid by the car the car contains, even of measured tons, more than the men are paid for. Under such circumstances it is not to the interest of the operator to weigh the coal as it is charged into the oven.

Further, in many districts coke making is simply for the purpose of utilizing the slack coal produced in mining or that which falls through the screen at the tipple when lump is sold. In such cases the slack is rarely, if ever, weighed as it is charged into the ovens, so that any statement as to the amount of coal used at such works will be an estimate. At some works the coal is often weighed for a brief period, and, the coke being weighed as it is sold, a percentage of yield is ascertained which is used in statements as to the amount of coal used and the yield of this coal in coke.

Great care has been exercised, in view of these facts, to reach a satisfactory estimate as to the amount of coal used in the production of coke, as given in the table immediately preceding, and the percentage yield of coal in coke as shown in the table next subsequent. Analyses of coals from most of the districts in the United States have been secured. These analyses, checked by information otherwise received as to the methods of coking in each district, have made it possible to reach a conclusion as to whether the returns made were approximately correct or not. Where it has been judged that they were incorrect, correspondence has usually led to revision. It is sometimes the custom of coke manufacturers who do not weigh the coal charged into the ovens to estimate that the yield of coke is equal to the percentage of the fixed carbon and ash in the coal. A report from a certain coke works showed a yield of 77 per cent. This was equal to the average amount of fixed carbon and ash in the coal. Further inquiry developed the fact that at other mines in this district, using the same character of coal, the yield as reported varied from 50 to 66 per cent. Upon the attention of the party making the return being called to these facts, the yield was reduced from 77 to 63 per cent. As coke is sold by weight, it has always

been assumed that the report of production of coke was accurate, and where the coal was not weighed, the yield of coal in coke being ascertained, a calculation could be made which would show approximately the amount of coal used.

But even under these conditions it is believed that more coal was actually used in the production of coke in each of the years covered by the above table than is shown.

It will also be observed that the amounts given in the above table differ materially from the figures given for the amount of coal made into coke which appear in the report on the production of coal—a separate chapter of this volume. In explanation of this it may be stated that this item in the coal report includes only such coal as is made into coke at the mines, and does not consider the coal which is first shipped to a point distant from the mines and there charged into the ovens. Such coal would be included in the shipments. For instance, the amount of coal made into coke in Alabama during 1897 was 2,451,475 tons, whereas in the report on the production of coal the amount of coal made into coke at the mines is given at only 1,137,196 tons. Similarly, in Pennsylvania the coal made into coke amounted to 13,583,646 tons, only 11,968,392 tons of which were made into coke at the mines.

The amount of coal necessary to produce a ton of coke, assuming that the above tables are approximately correct, was as follows:

*Coal required to produce a ton of coke, in tons or pounds.*

| Year. | Tons. | Pounds. | Year. | Tons. | Pounds. |
|---|---|---|---|---|---|
| 1880 | 1.57 | 3,140 | 1889 | 1.55 | 3,100 |
| 1881 | 1.59 | 3,180 | 1890 | 1.56 | 3,120 |
| 1882 | 1.58 | 3,160 | 1891 | 1.58 | 3,160 |
| 1883 | 1.56 | 3,120 | 1892 | 1.57 | 3,140 |
| 1884 | 1.63 | 3,260 | 1893 | 1.57 | 3,140 |
| 1885 | 1.58 | 3,160 | 1894 | 1.56 | 3,120 |
| 1886 | 1.56 | 3,120 | 1895 | 1.56 | 3,120 |
| 1887 | 1.56 | 3,120 | 1896 | 1.58½ | 3,170 |
| 1888 | 1.51 | 3,020 | 1897 | 1.57 | 3,140 |

The following table exhibits the percentage yield of coal in the manufacture of coke for the years 1880 to 1897, inclusive. By the "yield" is meant the percentage of the constituents of the coal that remains as coke after the process of coking. The table shows that the general average for most of the years given is about 64 per cent, but it is believed that even this is a little too high. It is not possible to acquire exact information on this point, for the reason that in many instances the coal is not weighed before being charged into the ovens. As stated in regard to the table showing the amount of coal made into

coke, the percentage yield, like the amount, is largely estimated. Probably the actual yield of coke throughout the United States, if the actual weight of the coal charged into the ovens and the actual weight of the coke drawn had been taken, would not have exceeded 60 or 61 per cent.

*Percentage yield of coal in the manufacture of coke in the United States in the years 1880 to 1897, inclusive, by States and Territories.*

| State or Territory. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 57 | 59 | 58 | 60 | 60 | 59 | 59 | 59 | 60 |
| Colorado | 49 | 50 | 57 | 60 | 64 | 63 | 62.6 | 64 | 65.6 |
| Georgia | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 50 | 60 |
| Illinois | 41 | 42 | 45 | 43 | 43 | 48 | 46 | 55.5 | 56.9 |
| Indiana | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 50 | 45 |
| Indian Territory | 62 | 62 | 62 | 62 | 62 | 62 | 62 | 50 | 57 |
| Kansas | 64 | 64.4 | 65 | 62.9 | 62.3 | 53.7 | 54.2 | 54 | 59 |
| Kentucky | 60 | 60 | 59 | 60 | 64 | 53 | 50 | 50 | 54 |
| Missouri | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 52 |
| Montana | 0 | 0 | 0 | 0 | 46 | 58.5 | 0 | 66.7 | 60 |
| New Mexico | 0 | 0 | 66.7 | 57.3 | 57.5 | 56.3 | 56 | 61 | 58 |
| Ohio | 58 | 59 | 57 | 58 | 58 | 57 | 59 | 56 | 54 |
| Pennsylvania | 65 | 64 | 64 | 65 | 62 | 64.6 | 65.2 | 65.3 | 68 |
| Tennessee | 60 | 60 | 60 | 62 | 63 | 53 | 59 | 61 | 61 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 0 |
| Utah | 50 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia | 0 | 0 | 0 | 64.5 | 64.3 | 60 | 61.1 | 70.8 | 64.7 |
| Washington | 0 | 0 | 0 | 0 | 57.5 | 57 | 58.9 | 65 | 0 |
| West Virginia | 60 | 61 | 63 | 63 | 62 | 63 | 62 | 63.3 | 61.6 |
| Wisconsin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 |
| Wyoming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total average. | 63 | 63 | 63 | 64 | 61 | 63 | 64 | 64.2 | 66 |

| State or Territory. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 59 | 59 | 60 | 58 | 50 | 58.7 | 58.7 | 57.5 | 58.8 |
| Colorado | 63 | 60 | 61 | 63.9 | a57.7 | a58.5 | a58.6 | a56.9 | a55.6 |
| Georgia | 60 | 60 | 62.5 | 51.5 | 52.8 | 55.9 | 50.6 | 49 | 49.3 |
| Illinois | 60 | 55 | 52 | 66 | 66.7 | 57.9 | 62.5 | 66.7 | 43 |
| Indiana | 51 | 51 | 44 | 49.7 | 49.6 | 48.6 | 48.5 | 49 | 41.4 |
| Indian Territory | 50 | 50 | 46 | 50 | 47 | 42 | 43.8 | 40 | 44.3 |
| Kansas | 64 | 56 | 52 | 59.2 | 62.8 | 63.5 | 62.8 | 53.5 | 52.5 |
| Kentucky | 52 | 51 | 52 | 51 | 50 | 44.8 | 40.1 | 48.6 | 50 |
| Missouri | 62 | 65 | 66 | 65.8 | 66.5 | 65.4 | 65 | 55.9 | 56 |
| Montana | 46 | 45 | 47 | 53.6 | 48.5 | 52.2 | 45.4 | 53 | 48.5 |
| New Mexico | 48 | 51.5 | 57.5 | 0 | 39.5 | 50 | 65.5 | 61.7 | 55.6 |

a Average, including Utah.

*Percentage yield of coal in the manufacture of coke in the United States, etc.*—Continued.

| State or Territory. | 1889. | 1890. | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|---|---|
| New York | ..... | ..... | ..... | ..... | 84.8 | ..... | 83.4 | ..... | ..... |
| Ohio | 56 | 59 | 56 | 54.4 | 52 | 59 | 56 | 62.7 | 62.7 |
| Pennsylvania | 66 | 65 | 66 | 66.1 | 66 | 66.9 | 66.2 | a66.1 | a66.2 |
| Tennessee | 57 | 58 | 58 | 59 | 59 | 56.6 | 57.9 | 56.5 | 55 |
| Texas | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 0 | 56.3 |
| Utah | 34 | 35 | 31 | ..... | ..... | ..... | ..... | ..... | ..... |
| Virginia | 61 | 66 | 58.8 | 65.3 | 64.5 | 64.2 | 59.6 | 58.9 | 61.6 |
| Washington | 55 | 64 | 60 | 58 | 59 | 61.2 | 65.9 | 67 | 67 |
| West Virginia | 61 | 59 | 58.8 | 60.5 | 60.8 | 60.4 | 61.6 | 61.4 | 61 |
| Wisconsin | 62.5 | 65 | 65 | 62.2 | 62 | 67 | 60 | 62 | 59 |
| Wyoming | 0 | 0 | 60 | 0 | 54 | 50 | 47.8 | 47.6 | 43.7 |
| Total average. | 64 | 64 | 63 | 64 | 63.5 | 64 | 64 | 63 | 63.5 |

*a* Average, including New York.

## AMOUNT AND VALUE OF COAL USED IN COKE MAKING.

In the following tables is given a statement of the amount and value of the coal used in the manufacture of coke in the United States during the last three years, and also the amount of coal necessary to produce one ton of coke, together with the value of the coal used to make one ton of coke. The average price per ton of coal used in 1897 was 63 cents, against 65.9 cents in 1896 and 66 cents in 1895. It can be seen from this that the higher price of coke in 1896 and its lower price in 1897 were not due to any advance or decline in the value of the coal used in its manufacture, except possibly in Alabama, where the value of the coal to a ton of coke increased from $1.385 in 1896 to $1.42 in 1897; in New Mexico, where it advanced from $1.07 to $1.58, and in Washington, where it advanced from $2.67 to $2.95. In the other two States where the prices for coke were higher in 1897 the value of the coal to a ton of coke was less. In Colorado the value of coal per ton decreased from 94 cents in 1896 to 71.6 cents, and the value of coal to a ton of coke decreased from $1.65 to $1.29, while the price of coke advanced from $2.88 to $2.916. In Wisconsin the value of the coal declined from $2 to $1.88 per ton, the value of the coal in a ton of coke from $3.24 to $3.20, and the value of the coke advanced from $3.94 to $4.36.

In 1895 the average value of the coal in a ton of coke was $1.03, while the average price of the coke was $1.44, a difference of 41 cents. In 1896 the value of the coal in a ton of coke was $1.04, only one cent more than it was in 1895, while the average price per ton of coke was $1.84, a difference of 80 cents between the value of the coal used.

in the coke and the coke made from it. In 1897 the average value of the coal used to a ton of coke was 99 cents, a decline of 5 cents from 1896, while the average price per ton of coke was $1.66, a difference of 67 cents between the value of the coal and the coke made from it.

Taking the six most important producing States, we find that in Pennsylvania the value of the coal used in making a ton of coke in 1897 was 87 cents and the price of coke $1.53, a difference of 66 cents, or 76 per cent. In West Virginia the value of the coal used in a ton of coke was 87 cents and the average price for coke $1.31, the coke being worth 50 per cent more than the coal charged into the ovens. In Alabama the value of the coal was $1.42 and that of the coke $2.14, a difference of 50 per cent. In Virginia the coal was worth 89 cents and the coke $1.40, a difference of 57 per cent. In Tennessee the difference between the value of the coal and the value of the coke was only 27 per cent, the figures being $1.42 and $1.81, respectively. In Colorado the difference was 126 per cent, the value of the coal being $1.29 and that of the coke $2.916, a difference of $1.626.

*Amount and value of coal used in the manufacture of coke in the United States in 1897, and amount and value of same per ton of coke.*

| State or Territory. | Coal used. | Total value of coal. | Value of coal per ton. | Amount of coal per ton of coke. | Value of coal to a ton of coke. |
|---|---|---|---|---|---|
| | *Short tons.* | | | *Short tons.* | |
| Alabama | 2,451,475 | $2,047,975 | $0.83½ | 1.70 | $1.42 |
| Colorado (*a*) | 616,592 | 441,450 | .716 | 1.80 | 1.29 |
| Georgia | 67,000 | 33,500 | .50 | 2.03 | 1.02 |
| Illinois | 3,591 | 1,436 | .40 | 2.32 | .93 |
| Indiana | 7,022 | 3,511 | .50 | 2.49 | 1.25 |
| Indian Territory | 68,495 | 57,581 | .84 | 2.25 | 1.89 |
| Kansas | 11,772 | 5,886 | .50 | 1.90 | .95 |
| Kentucky | 64,234 | 12,621 | .20 | 2.00 | .40 |
| Missouri | 4,627 | 2,698 | .583 | 1.78 | 1.04 |
| Montana | 139,907 | 301,046 | 2.15 | 2.06 | 4.43 |
| New Mexico | 2,585 | 2,282 | .88 | 1.80 | 1.58 |
| Ohio | 151,545 | 141,197 | .93 | 1.59 | 1.48 |
| Pennsylvania (*b*) | 13,538,646 | 7,825,569 | .578 | 1.51 | .87 |
| Tennessee | 667,996 | 525,755 | .787 | 1.81 | 1.42 |
| Texas | 700 | ..... | ..... | 1.78 | ..... |
| Virginia | 574,542 | 315,986 | .55 | 1.62 | .89 |
| Washington | 39,124 | 77,377 | 1.98 | 1.49 | 2.95 |
| West Virginia | 2,413,283 | 1,290,468 | .53 | 1.64 | .87 |
| Wisconsin | 29,207 | 55,000 | 1.88 | 1.70 | 3.20 |
| Wyoming | 54,976 | 43,980 | .80 | 2.29 | 1.83 |
| Total and averages | 20,907,319 | 13,185,318 | .63 | 1.57 | .99 |

*a* Figures given for Colorado include the statistics of Utah.
*b* Figures given for Pennsylvania include the statistics of New York.

*Amount and value of coal used in the manufacture of coke in the United States in 1896, and amount and value of same per ton of coke.*

| State or Territory. | Coal used. | Total value of coal. | Value of coal per ton. | Amount of coal per ton of coke. | Value of coal to a ton of coke. |
|---|---|---|---|---|---|
| | *Short tons.* | | | *Short tons.* | |
| Alabama | 2,573,713 | $2,049,732 | $0.796 | 1.74 | $1.385 |
| Colorado (*a*) | 639,238 | 601,362 | .94 | 1.76 | 1.65 |
| Georgia | 109,655 | 54,827 | .50 | 2.04 | 1.02 |
| Illinois | 3,900 | 975 | .25 | 1.50 | .375 |
| Indiana | 8,956 | 4,360 | .49 | 2.06 | 1.01 |
| Indian Territory | 53,028 | 43,257 | .816 | 2.52 | 2.056 |
| Kansas | 8,940 | 4,170 | .466 | 1.87 | .87 |
| Kentucky | 55,719 | 14,521 | .26 | 2.06 | .536 |
| Missouri | 4,471 | 2,520 | .56 | 1.79 | 1.00 |
| Montana | 113,165 | 194,747 | 1.72 | 1.88 | 3.23 |
| New Mexico | 39,286 | 25,918 | .66 | 1.62 | 1.069 |
| Ohio | 128,923 | 130,755 | 1.01 | 1.59 | 1.606 |
| Pennsylvania (*b*) | 11,124,610 | 6,957,038 | .625 | 1.51 | .944 |
| Tennessee | 600,379 | 438,212 | .73 | 1.77 | 1.29 |
| Virginia | 454,964 | 282,926 | .62 | 1.70 | 1.05 |
| Washington | 38,685 | 69,420 | 1.79 | 1.49 | 2.67 |
| West Virginia | 2,687,104 | 1,394,827 | .519 | 1.63 | .846 |
| Wisconsin | 8,648 | 17,207 | 2.00 | 1.62 | 3.24 |
| Wyoming | 41,038 | 28,727 | .70 | 2.10 | 1.47 |
| Total and averages. | 18,694,422 | 12,315,501 | .659 | 1.585 | 1.04 |

*a* Figures given for Colorado include the statistics of Utah.
*b* Figures given for Pennsylvania include the statistics of New York.

*Amount and value of coal used in the manufacture of coke in the United States in 1895, and amount and value of same per ton of coke.*

| State or Territory. | Coal used. | Total value of coal. | Value of coal per ton. | Amount of coal per ton of coke. | Value of coal to a ton of coke. |
|---|---|---|---|---|---|
| | *Short tons.* | | | *Short tons.* | |
| Alabama | 2,459,465 | $2,153,233 | $0.875 | 1.70 | $1.49 |
| Colorado (*a*) | 580,584 | 568,067 | .978 | 1.70 | 1.66 |
| Georgia | 118,900 | 77,285 | .65 | 1.97 | 1.28 |
| Illinois | 3,600 | 900 | .25 | 1.60 | .40 |
| Indiana | 9,898 | 4,749 | .48 | 2.06 | .99 |
| Indian Territory | 11,825 | 2,956 | .25 | 2.28 | .57 |
| Kansas | 8,424 | 3,555 | .42 | 1.59 | .67 |
| Kentucky | 63,419 | 12,811 | .20 | 2.49 | .50 |
| Missouri | 3,120 | 1,248 | .40 | 1.54 | .62 |
| Montana | 55,770 | 146,967 | 2.64 | 2.20 | 5.81 |
| New Mexico | 22,385 | 12,024 | .537 | 1.53 | .82 |
| Ohio | 51,921 | 50,593 | .97 | 1.79 | 1.74 |
| Pennsylvania | 14,211,567 | 8,752,418 | .616 | 1.51 | .93 |
| Tennessee | 684,655 | 518,401 | .757 | 1.73 | 1.31 |
| Virginia | 410,737 | 271,056 | .66 | 1.68 | 1.11 |
| Washington | 22,973 | 43,532 | 1.89 | 1.52 | 2.87 |
| West Virginia | 2,087,816 | 1,126,161 | .539 | 1.62 | .87 |
| Wisconsin | 8,287 | 19,474 | 2.35 | 1.67 | 3.92 |
| Wyoming | 10,240 | 7,680 | .75 | 2.09 | 1.57 |
| Total and averages. | 20,825,586 | 13,773,140 | .66 | 1.56 | 1.03 |

*a* Figures given for Colorado include the statistics of Utah.

## CONDITION IN WHICH COAL IS CHARGED INTO OVENS.

In the following table will be found a statement of the condition of coal when charged into ovens—that is, whether it is run of mine, slack, washed, or unwashed. The tables for 1897, 1896, and 1895 are given. The headings explain themselves. It is only necessary to state that run of mine, washed, includes that run-of-mine coal which is crushed before being washed.

*Character of coal used in the manufacture of coke in 1897.*

| State or Territory. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Alabama | 902,310 | 120,420 | 91,200 | 1,337,545 | 2,451,475 |
| Colorado (*a*) | 0 | 0 | 393,214 | 223,378 | 616,592 |
| Georgia | 0 | 67,000 | 0 | 0 | 67,000 |
| Illinois | 0 | 0 | 3,591 | 0 | 3,591 |
| Indiana | 0 | 0 | 0 | 7,022 | 7,022 |
| Indian Territory | 0 | 6,923 | 0 | 61,572 | 68,495 |
| Kansas | 0 | 0 | 11,772 | 0 | 11,772 |
| Kentucky | 4,176 | 0 | 0 | 60,058 | 64,234 |
| Missouri | 0 | 0 | 4,627 | 0 | 4,627 |
| Montana | 0 | 75,000 | 0 | 64,907 | 139,907 |
| New Mexico | 0 | 0 | 2,585 | 0 | 2,585 |
| Ohio | 92,192 | 0 | 29,353 | 30,000 | 151,545 |
| Pennsylvania (*b*) | 11,540,459 | 301,052 | 1,441,611 | 255,524 | 13,538,646 |
| Tennessee | 36,485 | 400,166 | 119,755 | 111,590 | 667,996 |
| Texas | 0 | 0 | 0 | 700 | 700 |
| Virginia | 286,158 | 0 | 227,363 | 61,021 | 574,542 |
| Washington | 0 | 39,124 | 0 | 0 | 39,124 |
| West Virginia | 373,205 | 28,145 | 1,800,528 | 211,405 | 2,413,283 |
| Wisconsin | 0 | 0 | 0 | 29,207 | 29,207 |
| Wyoming | 0 | 0 | 54,976 | 0 | 54,976 |
| Total | 13,234,985 | 1,037,830 | 4,180,575 | 2,453,929 | 20,907,319 |

*a* Includes Utah's consumption of coal.
*b* Includes coal coked in New York.

*Character of coal used in the manufacture of coke in 1896.*

| State or Territory. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Alabama | 1,292,191 | 70,125 | 51,674 | 1,159,723 | 2,573,713 |
| Colorado (*a*) | 143,604 | 0 | 378,776 | 116,858 | 639,238 |
| Georgia | 0 | 109,655 | 0 | 0 | 109,655 |
| Illinois | 0 | 0 | 0 | 3,900 | 3,900 |
| Indiana | 0 | 0 | 0 | 8,956 | 8,956 |
| Indian Territory | 0 | 0 | 0 | 53,028 | 53,028 |
| Kansas | 0 | 0 | 8,940 | 0 | 8,940 |
| Kentucky | 16,271 | 0 | 0 | 39,448 | 55,719 |
| Missouri | 0 | 0 | 4,471 | 0 | 4,471 |
| Montana | 0 | 50,000 | 0 | 63,165 | 113,165 |
| New Mexico | 0 | 0 | 39,286 | 0 | 39,286 |
| Ohio | 88,616 | 0 | 24,325 | 15,982 | 128,923 |
| Pennsylvania (*b*) | 9,289,089 | 273,082 | 1,463,047 | 99,392 | 11,124,610 |
| Tennessee | 0 | 206,319 | 219,231 | 174,829 | 600,379 |
| Virginia | 70,756 | 0 | 370,624 | 13,584 | 454,964 |
| Washington | 0 | 20,967 | 0 | 17,718 | 38,685 |
| West Virginia | 407,378 | 33,096 | 2,079,237 | 167,393 | 2,687,104 |
| Wisconsin | 0 | 0 | 5,183 | 3,465 | 8,648 |
| Wyoming | 0 | 0 | 41,038 | 0 | 41,038 |
| Total | 11,307,905 | 763,244 | 4,685,832 | 1,937,441 | 18,694,422 |

*a* Includes Utah's consumption of coal.
*b* Includes coal coked in New York

*Character of coal used in the manufacture of coke in 1895.*

| State or Territory. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| Alabama | 1,208,020 | 0 | 32,068 | 1,219,377 | 2,459,465 |
| Colorado (*a*) | 119,868 | 0 | 453,597 | 7,119 | 580,584 |
| Georgia | 0 | 118,900 | 0 | 0 | 118,900 |
| Illinois | 0 | 0 | 0 | 3,600 | 3,600 |
| Indiana | 0 | 0 | 0 | 9,898 | 9,898 |
| Indian Territory | 0 | 0 | 0 | 11,825 | 11,825 |
| Kansas | 0 | 0 | 8,424 | 0 | 8,424 |
| Kentucky | 0 | 502 | 624 | 62,293 | 63,419 |
| Missouri | 0 | 0 | 3,120 | 0 | 3,120 |
| Montana | 0 | 0 | 0 | 55,770 | 55,770 |
| New Mexico | 10,000 | 0 | 12,385 | 0 | 22,385 |
| New York | 0 | 0 | 22,207 | 0 | 22,207 |
| Ohio | 28,053 | 0 | 10,868 | 13,000 | 51,921 |
| Pennsylvania | 13,618,376 | 34,728 | 440,869 | 117,594 | 14,211,567 |
| Tennessee | 96,744 | 59,284 | 285,906 | 242,721 | 684,655 |
| Texas | 0 | 0 | 0 | 530 | 530 |
| Virginia | 114,802 | 0 | 295,935 | 0 | 410,737 |
| Washington | 0 | 0 | 0 | 22,973 | 22,973 |
| West Virginia | 405,725 | 24,054 | 1,476,003 | 182,034 | 2,087,816 |
| Wisconsin | 8,287 | 0 | 0 | 0 | 8,287 |
| Wyoming | 0 | 0 | 10,240 | 0 | 10,240 |
| Total | 15,609,875 | 237,468 | 3,052,246 | 1,948,734 | 20,848,323 |

*a* Including Utah's consumption.

From the above tables it is shown that 68.3 per cent of the total amount of coal used in making coke in 1897 was run of mine; in 1896 it was 64.6 per cent, and in 1895 it was 76 per cent. A notable increase is observed in the amount of washed coal charged into the ovens. In 1895, when 15,609,875 tons of unwashed run-of-mine coal were used, the washed run of mine was only 237,468 tons. In 1897 the amount of unwashed run-of-mine coal used was 13,234,985 tons, while the washed run of mine was 1,037,830 tons. The washed slack coal used in 1897 was about 500,000 tons more than the same character of coal used in either 1895 or 1896. The percentage of the total amount of washed coal used increased from 10.5 in 1895 to 14 in 1896 and 16.7 in 1897

In the following table the statistics regarding the character of the coal for the years 1890 to 1897, inclusive, are consolidated:

*Character of coal used in the manufacture of coke in the United States since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 14,060,907 | 338,563 | 2,674,492 | 931,247 | 18,005,209 |
| 1891 | 12,255,415 | 290,807 | 2,945,359 | 852,959 | 16,344,540 |
| 1892 | 14,453,638 | 324,050 | 3,256,493 | 779,156 | 18,813,337 |
| 1893 | 10,306,082 | 350,112 | 3,049,075 | 1,211,877 | 14,917,146 |
| 1894 | 9,648,750 | 405,266 | 3,102,652 | 1,192,082 | 14,348,750 |
| 1895 | 15,609,875 | 237,468 | 3,052,246 | 1,948,734 | 20,848,323 |
| 1896 | 11,307,905 | 763,244 | 4,685,832 | 1,937,441 | 18,694,422 |
| 1897 | 13,234,985 | 1,037,830 | 4,180,575 | 2,453,929 | 20,907,319 |

## IMPORTS.

The following table gives the quantities and value of coke imported and entered for consumption in the United States from 1869 to 1897, inclusive. In the reports of the Treasury Department the quantities given are long tons. These have been reduced to short tons to make the tables consistent with the other tables in this report:

*Coke imported and entered for consumption in the United States, 1869 to 1897, inclusive.*

| Year ending— | Quantity. | Value. | Year ending— | Quantity. | Value. |
|---|---|---|---|---|---|
| | *Short tons.* | | | *Short tons.* | |
| June 30, 1869 | ..... | $2,053 | June 30, 1884 | 14,483 | $36,278 |
| 1870 | ..... | 6,388 | 1885 | 20,876 | 64,814 |
| 1871 | ..... | 19,528 | Dec. 31, 1886 | 28,124 | 84,801 |
| 1872 | 9,575 | 9,217 | 1887 | 35,320 | 100,312 |
| 1873 | 1,091 | 1,366 | 1888 | 35,201 | 107,914 |
| 1874 | 634 | 4,588 | 1889 | 28,608 | 88,008 |
| 1875 | 1,046 | 9,648 | 1890 | 20,808 | 101,767 |
| 1876 | 2,065 | 8,657 | 1891 | 50,753 | 223,184 |
| 1877 | 4,068 | 16,686 | 1892 | 27,420 | 86,350 |
| 1878 | 6,616 | 24,186 | 1893 | 37,183 | 99,683 |
| 1879 | 6,035 | 24,748 | 1894 | 32,566 | 70,359 |
| 1880 | 5,047 | 18,406 | 1895 | 29,622 | 71,366 |
| 1881 | 15,210 | 64,987 | 1896 | 43,372 | 114,713 |
| 1882 | 14,924 | 53,244 | 1897 | 34,937 | 98,077 |
| 1883 | 20,634 | 113,114 | | | |

## DEVELOPMENT OF BY-PRODUCT COKE MAKING.

Coke making in the United States may be said to be at the beginning of a new era. There is not going to be any revolution, nor any unsettling of existing conditions by the development of the by-product systems of coke making, whose progress in this country is shown in the statistics presented in these reports. It has become the habit of late to designate the prevalent method of coke making in this country as the "wasteful" beehive oven, and to criticise unfavorably the action of producers for not only failing to save the valuable contents of the coal, but also for the pollution of the atmosphere by the smoke and gases given off. In many cases the latter is the stronger objection. It is not to be doubted that men and corporations who have millions of dollars invested in coal lands, mines, and coking plants will employ such methods in their business as will make the best returns. When we speak of the beehive oven as a wasteful method of producing coke we must take into consideration, first, the initial cost of the plant for saving the by-products; second, the increased cost, if any, of operation and maintenance; and third (which is very important), a profitable market for the products. If our great coke-producing regions were in a vicinity where the gas produced in the process could be readily and profitably disposed of for manufacturing or domestic purposes there is no doubt that by-product plants would rapidly displace the bee-hive oven. The remoteness of the coking districts from markets for consumption will cause the development of by-product coke making to be a thing of gradual growth. Profitable markets will have to be developed for the by-products; and it must also be considered that increased supplies of fuel gas, tar, and ammonia—the principal by-products—will necessarily depress prices.

The new era upon which coke making in the United States is entering was inaugurated by the construction of 12 Semet-Solvay ovens at Syracuse, New York. They were begun in 1891 and completed in 1893. They are operated in connection with the Solvay Process Soda Works in that city, and the ammonia is collected for use in making soda ash, while it is an easy matter to dispose of the tar and gas. Thirteen more of the same style of ovens were added to this plant in 1896, and they have all been in steady operation ever since. The 12 ovens built in 1893 may be considered in the way of experimental work, for it is noticed that no by-product ovens were begun in either 1893 or 1894, and it was not until 1895 that the additional 13 ovens were begun at Syracuse. The successful operations of these ovens at Syracuse having been demonstrated, two more banks of ovens, in addition to the 13 at that place, were begun in the same year. One of these, a bank of 25 ovens, was begun at Sharon, in Mercer County, Pennsylvania; the other, consisting of 50 ovens, was begun at Dunbar, in Fayette County. Both of these plants were completed and began making coke in 1896.

In 1895 was also begun the initial plant of Otto-Hoffmann by-product ovens at Johnstown, Pennsylvania. These were also completed in 1896. In the same year (1895) the construction of 30 Newton-Chambers ovens was begun at Latrobe, Pennsylvania, which were likewise completed in 1896. These ovens are simply beehive ovens, with apparatus for saving the by-products, and the heat of the coking process is generated in the oven itself. In the other two systems mentioned the heat is generated in flues outside of the coking chamber, the Semet-Solvay having the flues set horizontally and the Otto-Hoffmann having vertical flues. The details of the principles upon which these ovens are operated have been fully described in previous volumes of Mineral Resources, by contributions to the technical press, and by papers presented before technical societies. It is not considered necessary, therefore, to repeat such descriptions in this report.

Among the 383 ovens building at the close of 1896 there were 120 Otto-Hoffmann by-product ovens in the Pittsburg district. These, and the completion of the 88 Semet-Solvay ovens, the 60 Otto-Hoffmann ovens at Johnstown, and 30 Newton-Chambers ovens, together with a small experimental plant of 3 Slocum ovens at Bolivar, Pennsylvania, completed the record for the year. In 1897 we find that 120 ovens of the Otto-Hoffmann type have been completed in the Pittsburg district and 400 more are reported in course of construction, near Boston, Massachusetts, in the summer of 1898. No Semet-Solvay ovens were completed in 1897, but the close of the year finds 120 of this type building at Ensley, Alabama, while preparations are reported as making for the erection of 75 more at Wheeling, West Virginia.

From the foregoing it is seen that at the close of 1897 there were 310 by-product ovens in active operation and 195 in course of construction or contemplated. These do not include what is promised to be the most extensive operations of this kind yet proposed. Reference is here made to the plant at Everett, Massachusetts, the plans for which have been laid for some time, but upon which no actual building was done until the spring of 1898. It is stated that the plant at completion will consist of 1,200 Otto-Hoffmann ovens, 400 of which are in course of construction at the time of writing this report, July, 1898. The work is being carried on by the New England Coke and Gas Company, and it was inaugurated for the purpose of utilizing Nova Scotia coal, in which mines a large amount of American capital is invested. Contracts have already been made for the disposal, in the city of Boston, of all the gas produced.

It is to be observed that in every instance presented the by-product plants have been located where the gas produced and not consumed in the process can be profitably disposed of, while at Syracuse the ammonia also is immediately consumed. At Dunbar are extensive ironworks in which the gas can be used for fuel. The locomotive-tire works at Latrobe can use the surplus fuel gas produced at the Newton-Chambers ovens at that place. At Johnstown and along the Monongahela River

near Pittsburg the gas is readily disposed of, the declining supply of natural gas making a supply of by-product fuel gas a desirable factor.

The new era in coke making, consequently, upon which we are entering, does not mean a change in methods only. It means also the gradual shifting of the coke-making industry from the remote mining regions to the centers of industrial activity. The railroad companies will haul less in bulk but more in weight. Fuel gas will be largely substituted for coal in iron works, and not only will the country around the present coking regions be eventually cleared of its smoke-laden atmosphere, but cities like Pittsburg, Cleveland, Chicago, etc., will be supplied with smokeless fuel for domestic and manufacturing purposes.

In the chapter on the production of coal comment is made on the inroads which the use of gas and coke for domestic purposes is making upon the anthracite coal trade in the Eastern cities. The eventual construction of by-product coke plants in the near vicinity of New York, Philadelphia, Baltimore, etc., may be expected to follow the demonstration of the success of the plant at Everett, Mass. The preparation of coke for domestic use has not waited for the development of the by-product ovens. Large producers of bee-hive coke in the Connellsville region have extensive plants for crushing the product and separating it into sizes for domestic use. In the heated summer months, when a quick, hot fire in cooking ranges is desirable, the use of coke has been found most satisfactory, and its use is growing. Gas is also largely used for this purpose. It is evident, therefore, that the by-product coke-makers will not have to give all their attention to the preparation of a metallurgical coke, nor depend entirely upon manufacturing industries for their market.

The late Joseph D. Weeks was greatly interested in the subject of by-product coke making, and devoted a large amount of time and labor to collecting information in regard to it. As an accredited representative of the United States Geological Survey, Mr. Weeks paid two visits to Europe for the purpose of studying the methods in operation there and to ascertain the results obtained. Every courtesy was extended Mr. Weeks by the operators of by-product coking establishments, some going so far as to give him access to their books and allowing him to take abstracts from them. Unfortunately, Mr. Weeks's sudden death, in December, 1896, occurred before he was able to publish in full the results of his investigations, and just at the time when the introduction of by-product ovens, for which he had contended so earnestly and faithfully for several years, was being successfully accomplished.

A portion of the results of Mr. Weeks's investigations have been published. This paper refers principally to the amount and value of the by-products obtained, not from laboratory tests, but from practical operations on a commercial scale. Mr. Weeks estimated that, considing the prices for tar, ammonia, and the excess gas [1] at that time (1895),

[1] By "excess" gas is meant that in excess of the amount consumed in coking.

the value of the by-products amounted to about 65 or 70 cents to the ton of coke. The amounts and values of the by-products vary of course with the quality of the coal. In his report for 1894, written and published in 1895, Mr. Weeks placed the contents of by-products in Connellsville coal at 1 to 1.2 per cent—say, 20 pounds—of sulphate of ammonia; from 3 to 3.5 per cent—say, 60 to 70 pounds—of tar; and from 1 to 1.75 per cent of benzole. The amount of gas produced will vary greatly. Mr. Weeks placed the amount of Connellsville coal at 8,000 cubic feet of gas per ton of coal. About 50 per cent of the gas is used in generating the heat in the coking process, so that, say, 4,000 cubic feet of excess gas would be available for revenue. In the Pocahontas coal these constituents would be much less, as this coal is low in volatile gases, running from 18 to 20 per cent of volatile matter, as compared with from 28 to 34 per cent in Connellsville, and the percentage of fixed carbon or coke being proportionately higher.

The foregoing figures regarding the by-products, quoted from Mr. Weeks, are taken per ton of coal. As it requires about 1½ tons of coal to produce 1 ton of coke, the by-products per ton of coke would be about 50 per cent more than the estimates given. In his report for 1894, from which these figures are taken, Mr. Weeks said: "A complete report on the various forms of the by-product ovens will be given in a supplementary report." In this Mr. Weeks doubtless referred to the records made at the by-product plants which he visited in Europe, and it is this report which Mr. Weeks never finished. In conversation with the writer, however, he stated that at a number of places he visited the revenue received from the by-products paid all the expenses connected with mining, transporting, and coking the coal (including royalties), and that the resultant coke was net profit to the producer.

As the Otto-Hoffmann and the Semet-Solvay ovens represent the principal systems so far adopted in this country, the following statistics regarding the use of the same ovens in other countries will be found of interest:

In Germany the Otto-Hoffmann oven is largely used, while the Semet-Solvay ovens have their greatest development in Belgium. At the close of 1897, according to the Colliery Guardian, of London, England, there were 729 Semet-Solvay ovens in operation and 412 in course of construction, a total of 1,141, exclusive of those in the United States. These included 135 in Great Britain, 25 in Lorraine, 16 in Japan, and 55 in northern France. The remainder are all said to be in Belgium, which, according to this, would seem to be the home, as it is the place of invention, of the Semet-Solvay oven.

In the Journal für Gasbeleuchtung und Wasserversorgung (Munich) the following résumé is given of the actual work of a battery of 60 Otto-Hoffmann ovens operating with local coals in the three principal mining districts of Germany:

One ton of coal produces, in the Ruhr district—coke, 1,672 pounds; tar, 60.5 pounds; sulphate of ammonia, 25.3 pounds. In Silesia—coke,

1,496 pounds; tar, 93.5 pounds; sulphate of ammonia, 26.4 pounds. In the Saar—coke, 1,540 pounds; tar, 91.3 pounds; sulphate of ammonia, 18.7 pounds.

The yearly product of 60 ovens is, in the Ruhr—coke, 51,300 tons; tar, 1,860 tons; sulphate of ammonia, 780 tons. In Silesia—coke, 48,000 tons; tar, 3,000 tons; sulphate of ammonia, 840 tons. In the Saar—coke, 40,500 tons; tar, 2,400 tons; sulphate of ammonia, 492 tons.

The generation, consumption, and surplus of gas for one oven per day are as follows: In the Ruhr—production, 32,000 cubic feet; consumption, 19,200 cubic feet; surplus, 12,800 cubic feet. In Upper Silesia—production, 36,800 cubic feet; consumption, 20,800 cubic feet; surplus, 16,000 cubic feet. In Saar—production, 32,000 cubic feet; consumption, 19,200 cubic feet; surplus, 12,800 cubic feet.

A battery of 60 ovens, working under the above conditions, is computed to furnish gas for their own heating, and yield a surplus of from 760,000 to 960,000 cubic feet per day to be used for other purposes. It is reckoned in practice that 3,200 cubic feet of this surplus coke gas is equivalent, for purposes of heating, to 193.5 pounds of coal; and the saving of fuel in working 60 coke ovens would therefore be: In the Ruhr, 21 tons per day and 7,560 tons per year; in Silesia, 26.25 tons per day and 9,450 tons per year; in the Saar, 21 tons per day and 7,560 tons per year.

Since, however, the Otto-Hoffmann oven involves also the use of the other appliances which require heat to the extent of one-third the amount saved in the form of gas, it follows that the actual economy in fuel is about two-thirds of the above totals expressed in coal. Add to this saving of coal the two by-products—sulphate of ammonia, worth in the market 2.35 cents per pound, and tar, worth about 0.2 cent per pound, and the profits which are claimed for this system do not appear incredible.

From another and trustworthy source it is announced that the revenue actually derived from the tar and ammonia produced by one year's working of a group of 60 ovens in Westphalia, which cost in construction $2,805 each, was about 25 per cent on the capital invested in the plant.

It is to be regretted that similar statistics from actual records regarding the operations of Semet-Solvay ovens are not available. Dr. William L. Dudley, in an address before the Engineering Association of the South, stated that the first cost of a Semet-Solvay oven, including the necessary ammonia condensers, was about $3,100, as against $325 for the ordinary beehive oven. The advantages claimed for the Semet-Solvay oven are: (1) long life of the oven itself, as it will last for ten years with very little repairing, whereas the beehive oven requires extensive repairs after a few years' use; (2) increase in product of coke, the Semet-Solvay oven coking 4 tons of coal every twenty-four hours, while the beehive oven will coke only 2 tons every forty-eight or sev-

enty-two hours; (3) better quality of coke, shown by a test in which 1,621 pounds of Semet-Solvay coke were used in producing a ton of pig iron, against 2,160 pounds of beehive coke to the ton of iron; (4) the by-products, which, according to Dr. Dudley, are, per ton of coal, 9.88 pounds of sulphate of ammonia, 43.5 pounds of coal tar, and about 5,000 cubic feet of excess gas—worth altogether about 48 cents per ton of coke.

While there are no available statistics of the results obtained at a plant of Semet-Solvay ovens for a given length of time and operated under normal conditions, Mr. R. M. Atwater, secretary of the Semet-Solvay Company, has kindly furnished the following statement of the results obtained from one Semet-Solvay oven under operation continuously for one year, using standard coal.

*Record of one Semet-Solvay oven for one year.*

| | | |
|---|---|---|
| Coal charged into oven | short tons | 1,600 |
| Coke produced | do | 1,150 |
| Total gas produced | cubic feet | 16,000,000 |
| Gas used by ovens | do | 10,000,000 |
| Surplus gas available for other purposes | do | 6,000,000 |
| Tar produced | gallons | 16,000 |
| Ammonia produced as sulphate | short tons | 16 |

Mr. Atwater has also permitted the use of the manuscript of a pamphlet about to be issued by the Semet-Solvay Company, from which the following has been abstracted:

The Semet-Solvay retort coke oven is primarily the invention of Mr. L. Semet, an engineer and director of Solvay & Co., of Brussels, Belgium. Since its first installation in Belgium, in 1882, it has been constantly improved in detail and perfected in operation. It has been adopted with favor in all the leading countries engaged in coal and iron production, as the following table shows:

*Number and capacity of Semet-Solvay ovens in operation and under construction.*

| Country. | Plants. | Ovens. | Volatile contents of the coal. | Annual capacity in production of coke. |
|---|---|---|---|---|
| | | | *Per cent.* | *Tons.* |
| Belgium | 10 | 579 | 16 to 21 | 663,000 |
| England | 11 | 370 | 30 to 35 | 416,000 |
| America | 7 | *a* 297 | 30 to 35 | 337,000 |
| France | 4 | 155 | 22 to 25 | 190,000 |
| Germany | 2 | 97 | 20 to 22 | 97,000 |
| Japan | 1 | 16 | ..... | 16,000 |
| Total | 35 | 1,514 | ..... | 1,719,000 |

*a* Including ovens built and building.

This wide acceptance of the system is the best assurance that the retort coke oven is no longer an experimental device.

In January, 1892, the Solvay Process Company put into operation the first block of retort ovens in this country, at Syracuse, New York. The distrust with which the innovation was regarded slowly gave way to appreciation. In 1895 a plant of 50 ovens was installed at Dunbar, Pennsylvania; in 1896 a plant of 25 ovens at Sharon, Pennsylvania; in 1897 plants of 60 ovens at Wheeling, West Virginia; 130 ovens at Ensley, Alabama; 10 ovens at Halifax, Nova Scotia, and 7 ovens in Boston, Massachusetts. The plant at Syracuse has been in uninterrupted operation for over five years. The operations of the later plants have all been for five years. They have all been satisfactory and arrangements are being made to increase their capacity. The product of these plants is blast-furnace and foundry coke of satisfactory quality for the best metallurgical work in the Bessemer and foundry iron furnaces.

The People's Heat and Light Company of Halifax, Nova Scotia, has recently completed a block of 10 modified Semet-Solvay ovens. Prof. Robert H. Richards, of the Massachusetts Institute of Technology, visited the plant early in the summer of the present year, and has kindly furnished the following brief description: Each oven is 5 feet 6 inches high, widens from 16 inches to 17 inches wide away from the ram and is 30 feet long. The time of coking in these ovens is from twenty to twenty-four hours. The Cape Breton coal yields 8,500 to 9,500 cubic feet of gas per ton, and 75 per cent of good quality of coke.

The plant makes 37 short tons of coke per day, producing a total of 310,000 cubic feet of gas, of which 100,000 cubic feet are sold as illuminating gas for the city of Halifax, while 40,000 cubic feet are sold as heating gas, and 170,000 cubic feet are consumed under the ovens. The tar and ammonia liquors are saved and sold.

In regard to the gas, the scheme is to send the earlier portions of the gas into the holders which distribute illuminating gas, and the moment the candle power of the gas that is being generated falls below 16, the gas is turned into the fuel gas holder. The fuel gas has a candle power of about $8\frac{1}{2}$.

The process appears to be one of the most satisfactory yet produced for furnishing good coke and good illuminating gas, practically without enrichment, and a fuel gas of sufficiently high calorific power, and at the same time it completely does away with the smoke nuisance for any city that will adopt it.

## THE COKING INDUSTRY, BY STATES.

### ALABAMA.

Since 1880 Alabama has stood within the first five of the coke-producing States. In two years only (1880 and 1881) was she so low as fifth place. In 1882 Alabama advanced to fourth place; in 1883 to third place, and in 1884 to second place. Once since then (in 1887) the State has fallen back to fourth place and four times to third place. In each case West Virginia has been the successful contestant for second place—in 1887, 1888, 1894, 1896, and 1897. The displacement of Alabama in 1896 was not due to any decrease in production, the output for the year being 31,439 tons more than in 1895, but was caused by an increased activity in West Virginia, when the operators profited by the high prices asked for Connellsville coke and added more than 360,000 tons to their product of 1895. West Virginia's output decreased over 175,000 tons in 1897, and if Alabama had equaled her output of 1896 the State would have regained her position, but the product fell below that of 1895, and Alabama continues in third place.

The coal fields of Alabama are divided into three subdistricts, known as the Warrior, the Coosa, and the Cahaba, these districts being named from the rivers which drain them. Coke ovens are built in all three districts, but coke has been made for the last three years in but two—the Warrior and the Cahába. The most important of these districts, both as a coal producer and coke maker, is the Warrior, the ovens in this district being located near Birmingham.

Of the 5,365 ovens in the State, 4,728 are in the Warrior district, and of the total production of 1,443,017 tons in 1897, 1,383,540 tons were made in the Warrior district.

While most of the ovens built in the State are of the ordinary beehive pattern—the more recent ones being of the usual dimensions, 12 feet in diameter and 7 feet high—it is evident from the frequent attempts that have been made to introduce other ovens that the beehive oven as a coker of Alabama coal is not entirely satisfactory. The ovens other than beehive, which have thus far been introduced successfully into Alabama, are solid-wall ovens, or ovens in which there are no flues in the walls, and in which the coking chamber or combustion chamber, wherein the heat for coking is produced, are the same. Two forms of these modified solid-wall ovens are in use in Alabama at the present time, one known as the "Thomas" oven, which has already been described in this series of reports, and the other as the "double oblong." These ovens are 21 feet long and 9 feet wide, open at both ends. The ovens are charged from the top and drawn at the ends. They produce in a given time about 75 per cent more coke than the ordinary beehive oven.

The close of 1897 finds Alabama introducing by-product coking ovens, 120 of the Semet-Solvay type being in course of construction on Decem-

ber 31. These ovens are building at Ensley for the Tennessee Coal, Iron and Railroad Company, and will undoubtedly begin a new era in coke making in Alabama.

Practical investigation has shown that the coke product of Alabama coal is greatly improved in quality by washing the coal before it is charged into the ovens. In 1890 the practice of washing was in an experimental stage, and 123,189 tons of coal, all of which was slack, was washed before coking. It would seem that these experiments were not entirely satisfactory, for in 1891 the amount of washed coal used was only 8,570 tons out of a total of 2,144,277 tons, but in 1892 the washed coal used increased to 111,500 tons, 4.4 per cent of the total, and has increased each year since then, until in 1897 the amount of washed slacked coal used was nearly eleven times the amount used in 1890, and added to this was an amount of washed run-of-mine coal nearly equal to the washed slack coal used in the earlier year. Washing run-of-mine coal was first tried in 1893, 51,163 tons of this being used in that year. This added to the 425,730 tons of washed slack made a total of 476,893 tons, more than four times the washed coal used in 1892, and 21 per cent of the total amount used in 1893. The next year, 1894, saw a decrease to 7,429 tons in the amount of run-of-mine coal washed, but the washed slack coal increased to 677,899 tons, making, altogether, 685,328 tons of washed coal, nearly 50 per cent more than in 1893, and equivalent to 43.5 per cent of the total amount of coal used. The big increase in percentage of washed coal used in 1894 was due, in part, to a falling off in the production of coke, all of which was in coke made from unwashed coal. In 1895 no run-of-mine coal was washed, but the washed slack coal nearly doubled, amounting to 1,219,377 tons, a little less than 50 per cent of the total. In 1896, the washing of run-of-mine coal was resumed, 70,125 tons being so prepared. Washed slack decreased about 60,000 tons, but the total washed coal increased about 10,000 tons, and was 48 per cent of the total. In 1897 the amount of washed run-of-mine coal increased to 120,420 short tons, and the washed slack to 1,337,545 tons, making a total of 1,457,965 tons of washed coal used, 59 per cent of the total.

The increasing use of washed coal is readily explained. It has been found that washing not only reduces the ash and sulphur, but, in many cases, improves the physical structure of the coke.

The statistics of coke production in Alabama since 1880 are as follows:

*Statistics of the manufacture of coke in Alabama from 1880 to 1897, inclusive*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per ct.* |
| 1880 .. | 4 | 316 | 100 | 106,283 | 60,781 | $183,063 | $3.01 | 57 |
| 1881 .. | 4 | 416 | 120 | 184,881 | 109,033 | 326,819 | 3.00 | 59 |
| 1882 .. | 5 | 536 | ..... | 261,839 | 152,940 | 425,940 | 2.79 | 58 |
| 1883 .. | 6 | 767 | 122 | 359,699 | 217,531 | 598,473 | 2.75 | 60 |
| 1884 .. | 8 | *a* 976 | 242 | 413,184 | 244,009 | 609,185 | 2.50 | 60 |
| 1885 .. | 11 | 1,075 | 16 | 507,934 | 301,180 | 755,645 | 2.50 | 59 |
| 1886 .. | 14 | *a* 1,301 | 1,012 | 635,120 | 375,054 | 993,302 | 2.65 | 59 |
| 1887 .. | 15 | 1,555 | 1,362 | 550,047 | 325,020 | 775,090 | 2.39 | 59 |
| 1888 .. | 18 | 2,475 | 406 | 848,608 | 508,511 | 1,189,579 | 2.34 | 60 |
| 1889 .. | 19 | 3,944 | 427 | 1,746,277 | 1,030,510 | 2,372,417 | 2.30 | 59 |
| 1890 .. | 20 | 4,805 | 371 | 1,809,964 | 1,072,942 | 2,589,447 | 2.41 | 59 |
| 1891 .. | 21 | 5,068 | 50 | 2,144,277 | 1,282,496 | 2,986,242 | 2.33 | 60 |
| 1892 .. | 20 | 5,320 | 90 | 2,585,966 | 1,501,571 | 3,464,623 | 2.31 | 58 |
| 1893 .. | 23 | 5,548 | 60 | 2,015,398 | 1,168,085 | 2,648,632 | 2.27 | 58 |
| 1894 .. | 22 | 5,551 | 50 | 1,574,245 | 923,817 | 1,871,348 | 2.025 | 58.7 |
| 1895 .. | 22 | 5,658 | 50 | 2,459,465 | 1,444,339 | 3,033,521 | 2.10 | 58.7 |
| 1896 .. | 24 | 5,363 | ..... | 2,573,713 | 1,479,437 | 3,064,960 | 2.07 | 57.5 |
| 1897 .. | 25 | 5,365 | 120 | 2,451,475 | 1,443,017 | 3,094,461 | 2.14 | 58.8 |

*a* One establishment made coke on the ground.

The character of the coal used in the manufacture of coke in Alabama since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Alabama since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890..... | 1,480,669 | 0 | 206,106 | 123,189 | 1,809,964 |
| 1891..... | 1,943,469 | 0 | 192,238 | 8,570 | 2,144,277 |
| 1892..... | 2,463,366 | 0 | 11,100 | 111,500 | 2,585,966 |
| 1893..... | 1,246,307 | 51,163 | 292,198 | 425,730 | 2,015,398 |
| 1894..... | 411,097 | 7,429 | 477,820 | 677,899 | 1,574,245 |
| 1895..... | 1,208,020 | 0 | 32,068 | 1,219,377 | 2,459,465 |
| 1896..... | 1,292,191 | 70,125 | 51,674 | 1,159,723 | 2,573,713 |
| 1897..... | 902,310 | 120,420 | 91,200 | 1,337,545 | 2,451,475 |

## COLORADO.

Although Colorado dropped from fourth place among the coke-producing States in 1896 to sixth place in 1897, the State retains its position as the most important coke producer outside of the Appalachian region. The coal fields and coking coals of the State have been fully described in the volumes of Mineral Resources for 1892 and 1894.

Coke production in Colorado attained its maximum figure in 1892, when the output amounted to 365,920 tons. It declined to 346,981 tons in 1893, since which year it has ranged from 301,140 tons in 1894 to 343,313 tons in 1896.

Mr. R. C. Hills, of Denver, who has carefully studied the coal fields of Colorado, and contributed more than anyone else to the knowledge of the coal resources of the State, has divided the coke-producing regions into three districts, which he designates as the Raton, the Grand River and the La Plata. In the first named, the Raton, are included all the coking plants in Las Animas County, and which had been subdivided by the late Joseph D. Weeks into the Raton Canyon and Trinidad subdistricts or fields. These are so closely related as coking districts, however, that they have been combined as one, and the nomenclature of Mr. Hills has been adopted. The district in 1896 had 810 ovens and produced 198,507 tons of coke. Two ovens were abandoned in 1897, reducing the total to 808, which produced 187,061 tons during the year.

The Grand River district contains the ovens located at Crested Butte and Cardiff, and which have been designated by Mr. Weeks as the Crested Butte and Coal Basin subdistricts. Coal coked at Crested Butte is mined there; the coal coked at Cardiff is mined at Spring Gulch. Mr. Hills considers the Coal Basin or Spring Gulch area as the most important coking coal field in the State. The coke, he states, is better adapted for the use of lead smelters than any other in the State, although it is not so well glazed as an iron smelter would desire. There are 368 ovens in the Grand River field, which produced 121,199 tons of coke in 1897 against 126,471 tons in 1896.

The La Plata district, which is the coking district we have called Durango, has three works with 58 ovens. The total production in this district in 1896 was 11,855 tons, and in 1897 7,846 tons.

Coke is also produced in Denver from coal brought from other districts. It is coked in a species of retort, operated somewhat on the plan of a gas retort and somewhat as a by-product coke oven. The plant consists of 36 retorts. A portion of the gas is used to fire the benches, for lighting, and also to raise steam. In addition to the gas used for these purposes there is a surplus of some 120,000 cubic feet per day, which is sold to the Denver Consolidated Gas Company for illuminating purposes. The coke made is used for domestic purposes in place of anthracite coal.

The statistics of the production of coke in Colorado from 1880 to 1897 are given in the following table. From 1892 to 1897, both inclusive, the statements of production of coke in Utah are included in Colorado.

*Statistics of the manufacture of coke in Colorado from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 .... | 1 | 200 | 50 | 51,891 | 25,568 | $145,226 | $5.68 | 49 |
| 1881 .... | 2 | 267 | 0 | 97,508 | 48,587 | 267,156 | 5.29 | 50 |
| 1882 .... | 5 | 344 | 0 | 180,549 | 102,105 | 476,665 | 4.67 | 57 |
| 1883 .... | 7 | 352 | 0 | 224,089 | 133,997 | 584,578 | 4.36 | 60 |
| 1884 .... | 8 | 409 | 24 | 181,968 | 115,719 | 409,930 | 3.45 | 64 |
| 1885 .... | 7 | 434 | 0 | 208,069 | 131,960 | 512,162 | 3.88 | 63 |
| 1886 .... | 7 | 483 | 0 | 228,060 | 142,797 | 569,120 | 3.99 | 62.6 |
| 1887 .... | 7 | 532 | 0 | 267,487 | 170,698 | 682,778 | 4.00 | 64 |
| 1888 .... | 7 | 602 | 100 | 274,212 | 179,682 | 716,305 | 4.00 | 65.6 |
| 1889 .... | 9 | 834 | 50 | 299,731 | 187,638 | 643,479 | 3.43 | 63 |
| 1890 .... | 8 | 916 | 30 | 407,023 | 245,756 | 959,246 | 3.90 | 60 |
| 1891 .... | 7 | 948 | 21 | 452,749 | 277,074 | 896,984 | 3.24 | 61 |
| 1892 (*a*). | 9 | *b* 1,128 | 220 | 599,200 | *c* 373,229 | 1,234,320 | 3.31 | 62.3 |
| 1893 (*a*). | 8 | *b* 1,154 | 200 | 628,935 | *d* 362,986 | 1,137,488 | 3.13 | 57.7 |
| 1894 (*a*). | 8 | *b* 1,154 | 250 | 542,429 | *e* 317,196 | 903,970 | 2.85 | 58.5 |
| 1895 (*a*). | 9 | *b* 1,169 | 0 | 580,584 | *f* 340,357 | 940,987 | 2.76 | 58.6 |
| 1896 (*a*). | 11 | *b* 1,275 | 0 | 639,238 | *g* 363,760 | 1,046,306 | 2.88 | 56.9 |
| 1897 (*a*). | 12 | *b* 1,273 | 0 | 616,592 | *h* 342,653 | 999,216 | 2.916 | 55.6 |

*a* Includes production and value of coke in Utah, and of coal coked.
*b* Includes 36 gas retorts.
*c* Colorado's coke production, 365,920 tons.
*d* Colorado's coke production, 346,981 tons.
*e* Colorado's coke production, 301,140 tons.
*f* Colorado's coke production, 317,838 tons.
*g* Colorado's coke production, 343,313 tons.
*h* Colorado's coke production, 319,036 tons.

As in Alabama, it has been found that washing the slack coal in Colorado improves the value of the coke made from it. No attempt to wash the coal was made prior to 1895. In that year the amount of slack coal washed before coking was 7,119 tons. In 1896 the amount of washed slack coal used was 116,858 tons, while in 1897 it increased to 223,378 tons and entirely supplanted the use of run-of-mine coal, none of which was used in the manufacture of coke in 1897.

The character of the coal used in the manufacture of coke in Colorado and Utah since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Colorado and Utah since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 36,058 | 0 | 395,023 | 0 | 431,081 |
| 1891 | 93,752 | 0 | 384,278 | 0 | 478,030 |
| 1892 | 82,098 | 0 | 517,102 | 0 | 599,200 |
| 1893 | 109,915 | 0 | 519,020 | 0 | 628,935 |
| 1894 | 126,642 | 0 | 415,787 | 0 | 542,429 |
| 1895 | 119,868 | 0 | 453,597 | 7,119 | 580,584 |
| 1896 | 143,604 | 0 | 378,776 | 116,858 | 639,238 |
| 1897 | 0 | 0 | 393,214 | 223,378 | 616,592 |

## GEORGIA.

Coking in Georgia is an industry of comparatively little importance, and is on the decline. The only coal produced in the State is from the extreme northwestern portion, which is cut by the eastern border of the Appalachian coal field. The coal, as it is mined, is washed before being coked. The amount of coal charged into the ovens is the amount mined, and not the weight of the coal after being washed.

The production in 1897 was only 33,000 tons, as compared with 53,673 tons in 1896, 60,212 tons in 1895, and 93,029 tons in 1894. Thirty-four ovens were abandoned in 1897, reducing the number in the State to 300.

The statistics of the production of coke in Georgia, 1880 to 1897, are as follows:

*Statistics of the manufacture of coke in Georgia, 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 1 | 140 | 40 | 63,402 | 38,041 | $81,789 | $2.15 | 60 |
| 1881 | 1 | 180 | 40 | 68,960 | 41,376 | 88,753 | 2.15 | 60 |
| 1882 | 1 | 220 | 44 | 77,670 | 46,602 | 100,194 | 2.15 | 60 |
| 1883 | 1 | 264 | 36 | 111,687 | 67,012 | 147,166 | 2.20 | 60 |
| 1884 | 1 | 300 | 0 | 132,113 | 79,268 | 169,192 | 2.13 | 60 |
| 1885 | 2 | 300 | 0 | 117,781 | 70,669 | 144,198 | 2.04 | 60 |
| 1886 | 2 | 300 | 0 | 136,133 | 82,680 | 179,031 | 2.17 | 60 |
| 1887 | 2 | 300 | 0 | 158,482 | 79,241 | 174,410 | 2.20 | 50 |
| 1888 | 1 | 290 | 0 | 140,000 | 83,721 | 177,907 | 2.12 | 60 |
| 1889 | 1 | 300 | 0 | 157,878 | 94,727 | 149,059 | 1.57 | 60 |
| 1890 | 1 | 300 | 0 | 170,388 | 102,233 | 150,995 | 1.48 | 60 |
| 1891 | 1 | 300 | 0 | 164,875 | 103,057 | 231,878 | 2.25 | 62.5 |
| 1892 | 1 | 300 | 0 | 158,978 | 81,807 | 163,614 | 2.00 | 51.5 |
| 1893 | 1 | 338 | 0 | 171,645 | 90,726 | 136,089 | 1.50 | 52.8 |
| 1894 | 1 | 338 | 0 | 166,523 | 93,029 | 116,286 | 1.25 | 55.9 |
| 1895 | 1 | 330 | 0 | 118,900 | 60,212 | 70,580 | 1.17 | 50.6 |
| 1896 | 1 | 334 | 0 | 109,655 | 53,673 | 68,486 | 1.276 | 49 |
| 1897 | 1 | 300 | 0 | 67,000 | 33,000 | 42,240 | 1.28 | 49.3 |

The character of the coal used in the manufacture of coke in Georgia since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Georgia since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 0 | 0 | 170,388 | 170,388 |
| 1891 | 106,131 | 0 | 0 | 58,744 | 164,875 |
| 1892 | 0 | 0 | 0 | 158,978 | 158,978 |
| 1893 | 0 | 0 | 0 | 171,645 | 171,645 |
| 1894 | 0 | 166,523 | 0 | 0 | 166,523 |
| 1895 | 0 | 118,900 | 0 | 0 | 118,900 |
| 1896 | 0 | 109,655 | 0 | 0 | 109,655 |
| 1897 | 0 | 67,000 | 0 | 0 | 67,000 |

## ILLINOIS.

Notwithstanding the efforts that have been made to improve the quality of coke manufactured from Illinois coal by washing the coal before coking, the production continues to be insignificant, the output in 1897 being the smallest on record. Laboratory tests have shown that some of the Illinois coals are true coking coals, but their coking qualities vary greatly and their successful use upon a large scale has not been demonstrated. The impurities in Illinois coals have worked against it in the manufacture of metallurgical coke, and as New River and Pennsylvania cokes can be obtained at reasonable cost in markets that would be fed by the Illinois product, consumers find it economy to use the superior article. The statistics of production in 1897 show that the percentage yield of Illinois coal in coke is increased by washing the coal, even if it does not produce an article capable of competing with Pennsylvania or West Virginia coke. From 1892 to 1896 the coal, all of which was slack, was washed before coking and the percentage of coke obtained varied from 57.9 per cent to 66.7 per cent. In 1897 the coal was not washed, and only 43 per cent of coke was obtained.

*Statistics of the manufacture of coke in Illinois from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 6 | 176 | 0 | 31,240 | 12,700 | $41,950 | $3.30 | 41 |
| 1881 | 6 | 176 | 0 | 35,240 | 14,800 | 45,850 | 3.10 | 42 |
| 1882 | 7 | 304 | 0 | 25,270 | 11,400 | 29,050 | 2.55 | 45 |
| 1883 | 7 | 316 | 0 | 31,170 | 13,400 | 28,200 | 2.10 | 43 |
| 1884 | 9 | 325 | 0 | 30,168 | 13,095 | 25,639 | 1.96 | 43 |
| 1885 | 9 | 320 | 0 | 21,487 | 10,350 | 27,798 | 2.68 | 48 |
| 1886 | 9 | 335 | 0 | 17,806 | 8,103 | 21,487 | 2.65 | 46 |
| 1887 | 8 | 278 | 0 | 16,596 | 9,108 | 19,594 | 2.13 | 55.5 |
| 1888 | 8 | 221 | 0 | 13,020 | 7,410 | 21,038 | 2.84 | 56.9 |
| 1889 | 4 | 149 | 0 | 19,250 | 11,583 | 29,764 | 2.57 | 60 |
| 1890 | 4 | 148 | 0 | 9,000 | 5,000 | 11,250 | 2.25 | 55 |
| 1891 | 1 | 25 | 0 | 10,000 | 5,200 | 11,700 | 2.25 | 52 |
| 1892 | 1 | 24 | 0 | 4,800 | 3,170 | 7,133 | 2.25 | 66 |
| 1893 | 1 | 24 | 0 | 3,300 | 2,200 | 4,400 | 2.00 | 66.7 |
| 1894 | 1 | 24 | 0 | 3,800 | 2,200 | 4,400 | 2.00 | 57.9 |
| 1895 | 3 | 129 | 0 | 3,600 | 2,250 | 4,500 | 2.00 | 62.5 |
| 1896 | 3 | 127 | 0 | 3,900 | 2,600 | 5,200 | 2.00 | 66.7 |
| 1897 | 2 | 126 | 0 | 3,591 | 1,549 | 2,895 | 1.87 | 43 |

The character of the coal used in the manufacture of coke in Illinois since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Illinois since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 0 | 0 | 9,000 | 9,000 |
| 1891 | 0 | 0 | 10,000 | 0 | 10,000 |
| 1892 | 0 | 0 | 4,800 | 0 | 4,800 |
| 1893 | 0 | 0 | 0 | 3,300 | 3,300 |
| 1894 | 0 | 0 | 0 | 3,800 | 3,800 |
| 1895 | 0 | 0 | 0 | 3,600 | 3,600 |
| 1896 | 0 | 0 | 0 | 3,900 | 3,900 |
| 1897 | 0 | 0 | 3,591 | 0 | 3,591 |

## INDIANA.

Conditions very similar to those which have discouraged coke making in Illinois prevail in Indiana. Good coking coals exist in the State, but the product obtained is not equal to that of Connellsville, New River, or Pocahontas, any of which can be purchased at very little difference in cost, and consumers prefer to pay the slightly higher price for the superior article. There are only two banks of ovens in the State, and only one of these produced coke in 1897. The production of Indiana in 1897, like that of Illinois, was the smallest in the history of the State, amounting to only 2,904 short tons, a decrease of 1,449 tons, or one-third, from the output of 1896.

All of the coal coked in the State is slack, and for the last three years all of it has been washed before charged into the ovens.

The statistics of the manufacture of coke in Indiana from 1886 to 1897, both inclusive, are given in the following table:

*Statistics of the manufacture of coke in Indiana from 1886 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1886 | 4 | 100 | 18 | 13,030 | 6,124 | $17,953 | $2.93 | 47 |
| 1887 | 4 | 119 | 0 | 35,600 | 17,658 | 51,141 | 2.81 | 50 |
| 1888 | 3 | 103 | 0 | 26,547 | 11,956 | 31,993 | 2.68 | 45 |
| 1889 | 4 | 111 | 0 | 16,428 | 8,301 | 25,922 | 3.12 | 51 |
| 1890 | 4 | 101 | 0 | 11,753 | 6,013 | 19,706 | 3.28 | 51 |
| 1891 | 2 | 84 | 0 | 8,688 | 3,798 | 7,596 | 2.00 | 44 |
| 1892 | 2 | 84 | 0 | 6,456 | 3,207 | 6,472 | 2.02 | 49.7 |
| 1893 | 2 | 94 | 0 | 11,549 | 5,724 | 9,048 | 1.58 | 49.6 |
| 1894 | 2 | 94 | 0 | 13,489 | 6,551 | 13,102 | 2.00 | 48.6 |
| 1895 | 2 | 94 | 0 | 9,898 | 4,804 | 9,333 | 1.94 | 48.5 |
| 1896 | 2 | 94 | 0 | 8,956 | 4,353 | 8,647 | 1.99 | 49 |
| 1897 | 2 | 94 | 0 | 7,022 | 2,904 | 5,795 | 1.995 | 41.4 |

The character of the coal used in the manufacture of coke in Indiana since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Indiana since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 0 | 0 | 11,753 | 11,753 |
| 1891 | 0 | 0 | 0 | 8,688 | 8,688 |
| 1892 | 0 | 0 | 0 | 6,456 | 6,456 |
| 1893 | 0 | 0 | 930 | 10,619 | 11,549 |
| 1894 | 0 | 0 | 8,689 | 4,800 | 13,489 |
| 1895 | 0 | 0 | 0 | 9,898 | 9,898 |
| 1896 | 0 | 0 | 0 | 8,956 | 8,956 |
| 1897 | 0 | 0 | 0 | 7,022 | 7,022 |

## INDIAN TERRITORY.

Intelligent effort to develop the manufacture of coke from Indian Territory coals is meeting with encouraging success. Prior to 1896 these efforts had been directed toward utilizing the slack coal produced at the mines of the Osage Coal and Mining Company, near MacAlester. During 1895 50 ovens were built by the Choctaw Coke Company, near the town of Alderson, for the purpose of utilizing the slack coal from the mines of the Choctaw, Oklahoma and Gulf Railroad Company at Alderson and Hartshorne. All of the coal charged into the ovens is washed, and 6,923 tons of washed run-of-mine coal was used in 1897 by the Osage company in addition to the slack coal used.

Mr. John Fulton, of Johnstown, Pennsylvania, has furnished the following information regarding the operations of the Choctaw Coke Company:

The works of this company, as stated, are located near the town of Alderson, on the line of the Choctaw, Oklahoma and Gulf Railroad. The plant consists of 50 beehive ovens, built in a double line. The ovens are 12 feet in diameter and 6 feet high. They have been planned intelligently, constructed on modern principles, and are well adapted for the manufacture of coke from the coals of that portion of the Choctaw field. The coal for coke manufacture is obtained from the two large mines of the railroad company, one at Alderson and the other at Hartshorne, 9 miles distant. In these mines two seams are worked—the McAlester and the Grady beds. These coal beds are from 1,200 to 1,300 feet apart, the McAlester being above and the Grady below. Each seam is about 4 feet thick and the coal of both possesses qualities

approaching the Connellsville coking coal, as is shown by the following analysis:

*Analysis of Indian Territory coking coal and coke.*

| | Coal. | Coke. |
|---|---|---|
| | *Per cent.* | *Per cent.* |
| Moisture | 1.48 | 1.55 |
| Volatile matter | 35.81 | 1.34 |
| Fixed carbon | 56.71 | 90.68 |
| Ash | 6.00 | 6.43 |
| Total | 100.00 | 100.00 |
| Sulphur | 1.05 | 1.84 |
| Phosphorus | .02 | .024 |

The coals are found in a deep trough or basin very similar to that of the Connellsville, and the mining is conducted chiefly by slopes, after the manner in vogue in the Connellsville field. Up to the close of 1897 only slack coal (washed) was used for coking, but recently it has been decided to use also run-of-mine coal (crushed and washed) in order to improve the quality and assure a uniform product of coke. The works produce principally 72-hour coke, although some 48-hour coke is made. The coke is resonant, silvery, and firm bodied. In general quality and appearance it resembles the standard coke of the Connellsville region of Pennsylvania. The works are managed with practical skill by the superintendent, Mr. John H. Needham. The average monthly output of the coke ovens has been given at 1,200 short tons. This, however, is being increased under recent improvements to 1,500 tons and upward a month.

The coke produced at these works is marketed mainly in Mexico, the city of Monterey being the official headquarters of President G. T. Potter for its sale to smelters, etc.

The total coke product of the Indian Territory in 1897 was 30,364 tons, an increase of nearly 50 per cent over 1896 and almost six times the product of 1895.

The statistics of the manufacture of coke in the Indian Territory from 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in the Indian Territory from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 1 | 20 | 0 | 2,494 | 1,546 | $4,638 | $3.00 | 62 |
| 1881 | 1 | 20 | 0 | 2,852 | 1,768 | 5,304 | 3.00 | 62 |
| 1882 | 1 | 20 | 0 | 3,266 | 2,025 | 6,075 | 3.00 | 62 |
| 1883 | 1 | 20 | 0 | 4,150 | 2,573 | 7,719 | 3.00 | 62 |
| 1884 | 1 | 20 | 0 | 3,084 | 1,912 | 5,736 | 3.00 | 62 |
| 1885 | 1 | 40 | 0 | 5,781 | 3,584 | 12,902 | 3.60 | 62 |
| 1886 | 1 | 40 | 0 | 10,242 | 6,351 | 22,229 | 3.30 | 62 |
| 1887 | 1 | 80 | 0 | 20,121 | 10,060 | 33,435 | 3.33 | 50 |
| 1888 | 1 | 80 | 0 | 13,126 | 7,502 | 21,755 | 2.90 | 57 |
| 1889 | 1 | 78 | 0 | 13,277 | 6,639 | 17,957 | 2.70 | 50 |
| 1890 | 1 | 78 | 0 | 13,278 | 6,639 | 21,577 | 3.25 | 50 |
| 1891 | 1 | 80 | 0 | 20,551 | 9,464 | 30,483 | 3.22 | 46 |
| 1892 | 1 | 80 | 0 | 7,138 | 3,569 | 12,402 | 3.47 | 50 |
| 1893 | 1 | 80 | 0 | 15,118 | 7,135 | 25,072 | 3.51 | 47 |
| 1894 | 1 | 80 | 0 | 7,274 | 3,051 | 10,693 | 3.50 | 42 |
| 1895 | 1 | 80 | 0 | 11,825 | 5,175 | 17,657 | 3.41 | 43.8 |
| 1896 | 2 | 130 | 0 | 53,028 | 21,021 | 73,574 | 3.50 | 40 |
| 1897 | 2 | 130 | 0 | 68,495 | 30,364 | 104,725 | 3.45 | 44.3 |

The character of the coal used in the manufacture of coke in the Indian Territory since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in the Indian Territory since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 0 | 0 | 13,278 | 13,278 |
| 1891 | 0 | 0 | 9,500 | 11,051 | 20,551 |
| 1892 | 0 | 0 | 0 | 7,138 | 7,138 |
| 1893 | 0 | 0 | 0 | 15,118 | 15,118 |
| 1894 | 0 | 0 | 0 | 7,274 | 7,274 |
| 1895 | 0 | 0 | 0 | 11,825 | 11,825 |
| 1896 | 0 | 0 | 0 | 53,028 | 53,028 |
| 1897 | 0 | 6,923 | 0 | 61,572 | 68,495 |

## KANSAS.

The coke industry of Kansas is only of local importance, the production of coke in this State being chiefly for domestic purposes and the smelting of lead and zinc. Most of the coke produced in the State is made by the lead and zinc smelters for their own use.

The statistics of the manufacture of coke in Kansas from 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in Kansas from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 2 | 6 | ..... | 4,800 | 3,070 | $6,000 | $1.95 | 64 |
| 1881 | 3 | 15 | ..... | 8,800 | 5,670 | 10,200 | 1.80 | 64.4 |
| 1882 | 3 | 20 | ..... | 9,200 | 6,080 | 11,460 | 1.70 | 66 |
| 1883 | 4 | 23 | ..... | 13,400 | 8,430 | 16,560 | 1.96 | 62.9 |
| 1884 | 4 | 23 | ..... | 11,500 | 7,190 | 14,580 | 2.02 | 62.5 |
| 1885 | 4 | 23 | ..... | 15,000 | 8,050 | 13,255 | 1.65 | 53.7 |
| 1886 | 4 | 36 | ..... | 23,062 | 12,493 | 19,204 | 1.54 | 54.2 |
| 1887 | 4 | 39 | ..... | 27,604 | 14,950 | 28,575 | 1.91 | 54 |
| 1888 | 6 | 58 | ..... | 24,934 | 14,831 | 29,073 | 1.96 | 59.5 |
| 1889 | 6 | 68 | ..... | 21,600 | 13,910 | 26,593 | 1.91 | 64 |
| 1890 | 7 | 68 | ..... | 21,809 | 12,311 | 29,116 | 2.37 | 56 |
| 1891 | 6 | 72 | ..... | 27,181 | 14,174 | 33,296 | 2.35 | 52 |
| 1892 | 6 | 75 | ..... | 15,437 | 9,132 | 19,906 | 2.18 | 59.2 |
| 1893 | 6 | 75 | 0 | 13,645 | 8,565 | 18,640 | 2.18 | 62.8 |
| 1894 | 6 | 61 | 0 | 13,288 | 8,439 | 15,660 | 1.855 | 63.5 |
| 1895 | 5 | 55 | 0 | 8,424 | 5,287 | 11,289 | 2.14 | 62.8 |
| 1896 | 6 | 55 | 0 | 8,940 | 4,785 | 8,676 | 1.813 | 53.5 |
| 1897 | 4 | 57 | 0 | 11,772 | 6,181 | 9,272 | 1.50 | 52.5 |

The character of the coal used in the manufacture of coke in Kansas since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Kansas since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 0 | 19,619 | 2,190 | 21,809 |
| 1891 | 0 | 0 | 27,181 | 0 | 27,181 |
| 1892 | 0 | 0 | 15,437 | 0 | 15,437 |
| 1893 | 0 | 0 | 12,445 | 1,200 | 13,645 |
| 1894 | 0 | 0 | 13,288 | 0 | 13,288 |
| 1895 | 0 | 0 | 8,424 | 0 | 8,424 |
| 1896 | 0 | 0 | 8,940 | 0 | 8,940 |
| 1897 | 0 | 0 | 11,772 | 0 | 11,772 |

## KENTUCKY.

Four ovens were added to Kentucky's number by the Ashland Coal and Iron Company in 1897, increasing the total to 268, and putting the number of establishments back to 5, the same as in 1895. One establishment, however, having a bank of 50 ovens did not make any coke in 1897, so that the actual number of producing establishments was 4, and the number of active ovens 218. The production of coke in 1897 was 32,117 short tons, an increase of 5,010 tons, or about 19 per cent, over 1896.

The statistics of the manufacture of coke in Kentucky from 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in Kentucky from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 5 | 45 | ..... | 7,206 | 4,250 | $12,250 | $2.88 | 59 |
| 1881 | 5 | 45 | ..... | 7,406 | 4,370 | 12,630 | 2.89 | 59 |
| 1882 | 5 | 45 | ..... | 6,906 | 4,070 | 11,530 | 2.83 | 59 |
| 1883 | 5 | 45 | ..... | 8,437 | 5,025 | 14,425 | 2.87 | 60 |
| 1884 | 5 | 45 | ..... | 3,451 | 2,223 | 8,760 | 3.94 | 64 |
| 1885 | 5 | 33 | ..... | 5,075 | 2,704 | 8,489 | 3.14 | 53 |
| 1886 | 6 | 76 | 2 | 9,055 | 4,528 | 10,082 | 2.23 | 50 |
| 1887 | 6 | 98 | ..... | 29,129 | 14,565 | 31,730 | 2.18 | 50 |
| 1888 | 10 | 132 | 2 | 42,642 | 23,150 | 47,244 | 2.04 | 54 |
| 1889 | 9 | 166 | 100 | 25,192 | 13,021 | 29,769 | 2.28 | 52 |
| 1890 | 9 | 175 | 303 | 24,372 | 12,343 | 22,191 | 1.80 | 51 |
| 1891 | 7 | 115 | 24 | 64,390 | 33,777 | 68,281 | 2.02 | 52 |
| 1892 | 5 | 287 | 100 | 70,783 | 36,123 | 72,563 | 2.01 | 51 |
| 1893 | 4 | 283 | 100 | 97,212 | 48,619 | 97,350 | 2.00 | 50 |
| 1894 | 6 | 293 | 0 | 66,418 | 29,748 | 51,566 | 1.73 | 44.8 |
| 1895 | 5 | 293 | 0 | 63,419 | 25,460 | 37,249 | 1.46 | 40.1 |
| 1896 | 4 | 264 | 0 | 55,719 | 27,107 | 42,062 | 1.55 | 48.6 |
| 1897 | 5 | 268 | 0 | 64,234 | 32,117 | 45,454 | 1.41 | 50 |

The character of the coal used in the manufacture of coke in Kentucky since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Kentucky since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 3,000 | 2,100 | 19,272 | 24,372 |
| 1891 | 11,000 | 0 | 3,500 | 49,890 | 64,390 |
| 1892 | 0 | 5,955 | 7,883 | 56,945 | 70,783 |
| 1893 | 825 | 11,973 | 26,759 | 57,655 | 97,212 |
| 1894 | 0 | 2,980 | 7,900 | 55,538 | 66,418 |
| 1895 | 0 | 502 | 624 | 62,293 | 63,419 |
| 1896 | 16,271 | 0 | 0 | 39,448 | 55,719 |
| 1897 | 4,176 | 0 | 0 | 60,058 | 64,234 |

## MISSOURI.

Coke production in Missouri is of comparatively small importance, and there is little to say in regard to the industry in the State except to note the addition of 8 new ovens by the Cherokee Lanyon Zinc Company at Nevada, bringing the total number up to 15. The three establishments in the State are all portions of zinc-smelting works who use their coke product for zinc smelting. The production in 1897 increased slightly over 1896.

The statistics of the production of coke in Missouri from 1887, when coking began in this State, to 1897 are as follows:

*Statistics of the manufacture of coke in Missouri from 1887 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1887 | 1 | 4 | ..... | 5,400 | 2,970 | $10,395 | $3.50 | 55 |
| 1888 | 1 | 4 | ..... | 5,000 | 2,600 | 9,100 | 3.50 | 52 |
| 1889 | 3 | 9 | ..... | 8,485 | 5,275 | 5,800 | 1.10 | 62 |
| 1890 | 3 | 10 | ..... | 9,491 | 6,136 | 9,240 | 1.51 | 65 |
| 1891 | 3 | 10 | ..... | 10,377 | 6,872 | 10,000 | 1.45 | 66 |
| 1892 | 3 | 10 | ..... | 11,088 | 7,299 | 10,949 | 1 50 | 65.8 |
| 1893 | 3 | 10 | 0 | 8,875 | 5,905 | 9,735 | 1.65 | 66.5 |
| 1894 | 3 | 10 | 0 | 3,442 | 2,250 | 3,563 | 1.58 | 65.4 |
| 1895 | 3 | 10 | 0 | 3,120 | 2,028 | 2,442 | 1.20 | 65 |
| 1896 | 3 | 7 | 0 | 4,471 | 2,500 | 4,131 | 1.65 | 55.9 |
| 1897 | 3 | 15 | 0 | 4,627 | 2,593 | 3,890 | 1.50 | 56 |

The character of the coal used for coke in Missouri since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Missouri since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 0 | 9,491 | 0 | 9,491 |
| 1891 | 0 | 0 | 10,377 | 0 | 10,377 |
| 1892 | 0 | 0 | 11,088 | 0 | 11,088 |
| 1893 | 0 | 0 | 8,875 | 0 | 8,875 |
| 1894 | 0 | 0 | 3,442 | 0 | 3,442 |
| 1895 | 0 | 0 | 3,120 | 0 | 3,120 |
| 1896 | 0 | 0 | 4,471 | 0 | 4,471 |
| 1897 | 0 | 0 | 4,627 | 0 | 4,627 |

## MONTANA.

Coke production in Montana has increased each year since 1894, when, owing to the panic and business depression, it fell off to about one-half of what it was in 1892. The product in 1896 was the largest up to that time, and the output of 1897 was 11 per cent larger than 1896. The number of establishments and ovens remain the same.

The statistics of the manufacture of coke in Montana from 1883, when ovens were first reported, to 1897 are as follows:

*Statistics of the manufacture of coke in Montana from 1883 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1883 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1884 | 3 | 5 | 12 | 165 | 75 | $900 | $12.00 | 46 |
| 1885 | 2 | 2 | 0 | 300 | 175 | 2,063 | 11.72 | 58.5 |
| 1886 | 4 | 16 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1887 | 2 | 27 | 0 | 10,800 | 7,200 | 72,000 | 10.00 | 66⅔ |
| 1888 | 1 | 40 | 0 | 20,000 | 12,000 | 96,000 | 8.00 | 60 |
| 1889 | 2 | 90 | 50 | 30,576 | 14,043 | 122,023 | 8.69 | 46 |
| 1890 | 2 | 140 | 0 | 32,148 | 14,427 | 125,655 | 8.71 | 45 |
| 1891 | 2 | 140 | 0 | 61,667 | 29,009 | 258,523 | 8.91 | 47 |
| 1892 | 2 | 153 | 0 | 64,412 | 34,557 | 311,013 | 9.00 | 53.6 |
| 1893 | 2 | 153 | 0 | 61,770 | 29,945 | 239,560 | 8.00 | 48.5 |
| 1894 | 2 | 153 | 0 | 33,313 | 17,388 | 165,187 | 9.50 | 52.2 |
| 1895 | 3 | 303 | 0 | 55,770 | 25,337 | 189,856 | 7.49 | 45.4 |
| 1896 | 3 | 303 | 0 | 113,165 | 60,078 | 425,483 | 7.08 | 53 |
| 1897 | 3 | 303 | 0 | 139,907 | 67,849 | 467,481 | 6.89 | 48.5 |

The character of the coal used in the manufacture of coke in Montana since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Montana.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 22,852 | 0 | 9,296 | 32,148 |
| 1891 | 0 | 34,000 | 0 | 27,667 | 61,667 |
| 1892 | 0 | 28,000 | 0 | 36,412 | 64,412 |
| 1893 | 0 | 44,000 | 0 | 17,770 | 61,770 |
| 1894 | 0 | 33,313 | 0 | 0 | 33,313 |
| 1895 | 0a | 0 | 0 | 55,770 | 55,770 |
| 1896 | 0 | 50,000 | 0 | 63,165 | 113,165 |
| 1897 | 0 | 75,000 | 0 | 64,907 | 139,907 |

## NEW MEXICO.

Seventy-six new ovens were built in 1897 at Gardner, near Raton, by the Raton Coal and Coke Company, but they did not begin making coke before the 1st of January, 1898. The production at the one other establishment fell off from 24,228 tons in 1896 to 1,438 tons in 1897. All of the coke made in the Territory is used by silver smelters in the vicinity of the ovens.

The statistics of the production of coke in New Mexico from 1882, when coke ovens were first reported, until 1897 are as follows:

*Statistics of the manufacture of coke in New Mexico from 1882 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. (a) | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1882 | 2 | 0 | 12 | 1,500 | 1,000 | $6,000 | $6.00 | 66⅔ |
| 1883 | 2 | 12 | 28 | 6,941 | 3,905 | 21,478 | 5.50 | 57½ |
| 1884 | 2 | 70 | 0 | 29,990 | 18,282 | 91,410 | 5.00 | 57½ |
| 1885 | 2 | 70 | 0 | 31,889 | 17,940 | 89,700 | 5.00 | 56¼ |
| 1886 | 2 | 70 | 0 | 18,194 | 10,236 | 51,180 | 5.00 | 56 |
| 1887 | 1 | 70 | 0 | 22,549 | 13,710 | 82,260 | 6.00 | 61 |
| 1888 | 1 | 70 | 0 | 14,628 | 8,540 | 51,240 | 6.00 | 58 |
| 1889 | 2 | 70 | 0 | 7,162 | 3,460 | 18,408 | 5.32 | 48 |
| 1890 | 2 | 70 | 0 | 3,980 | 2,050 | 10,025 | 4.89 | 51.5 |
| 1891 | 1 | 70 | 0 | 4,000 | 2,300 | 10,925 | 4.75 | 57.5 |
| 1892 | 1 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1893 | 1 | 50 | 0 | 14,698 | 5,803 | 18,476 | 3.18 | 39.5 |
| 1894 | 1 | 50 | 0 | 13,042 | 6,529 | 28,213 | 4.32 | 50 |
| 1895 | 1 | 50 | 0 | 22,385 | 14,663 | 29,491 | 2.01 | 65.5 |
| 1896 | 1 | 50 | 0 | 39,286 | 24,228 | 48,453 | 2.00 | 61.7 |
| 1897 | 2 | 126 | 0 | 2,585 | 1,438 | 3,232 | 2.25 | 55.6 |

a At one works there are ten stone pits, with an average capacity of 10 tons each.

The character of the coal used in the manufacture of coke in New Mexico since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in New Mexico since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 3,980 | 0 | 0 | 0 | 3,980 |
| 1891 | 4,000 | 0 | 0 | 0 | 4,000 |
| 1892 | 0 | 0 | 0 | 0 | 0 |
| 1893 | 14,698 | 0 | 0 | 0 | 14,698 |
| 1894 | 0 | 0 | 13,042 | 0 | 13,042 |
| 1895 | ..... | ..... | ..... | ..... | 22,385 |
| 1896 | 0 | 0 | 39,286 | 0 | 39,286 |
| 1897 | 0 | 0 | 2,585 | 0 | 2,585 |

## NEW YORK.

The authority to publish separately the figures of production at the Semet-Solvay works, near Syracuse, has been withheld for 1896 and 1897, and the output for the last two years is included in Pennsylvania's production. The 13 ovens reported as building in 1893, 1894, and 1895 were completed in 1896, increasing the total number to 25.

The statistics of the manufacture of coke in New York from 1893 to 1897 are as follows:

*Statistics of the manufacture of coke in New York, 1893 to 1897.*

| | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|
| Number of establishments | 1 | 1 | 1 | 1 | 1 |
| Number of ovens built | 12 | 12 | 12 | 25 | 25 |
| Number of ovens building | 13 | 13 | 13 | 0 | 0 |
| Amount of coke produced..tons.. | 12,850 | 16,500 | 18,521 | ..... | ..... |
| Amount of coal used.....do... | 15,150 | ..... | 22,207 | ..... | ..... |
| Yield of coal in coke....per cent.. | 84.8 | ..... | 83.4 | ..... | ..... |

## OHIO.

Notwithstanding the large consumption of coke in Ohio and the large fields of coking coals in the State, the coking industry is of slight importance. This is doubtless due to the same cause that obtains in Indiana, the proximity of the Connellsville, New River, and Pocahontas fields, and the cheapness with which these cokes can be procured.

In previous reports of Mineral Resources the State has been divided into two coke-producing districts, called the Ohio and the Cincinnati. This division is continued in the present chapter. Two establishments having 175 ovens in the Cherry Valley iron district are included in the Ohio coke district.

The coke production of the State in 1897 was the largest in fifteen years, most of the increase being in the Cincinnati district.

In the following table the statistics of the production of coke in the two districts of Ohio for the years 1880 to 1897 are consolidated:

*Statistics of the manufacture of coke in Ohio from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 15 | 616 | 25 | 172,453 | 100,596 | $255,905 | $2.54 | 58 |
| 1881..... | 15 | 641 | 0 | 201,045 | 119,469 | 297,728 | 2.49 | 59 |
| 1882..... | 16 | 647 | 0 | 181,577 | 103,722 | 266,113 | 2.57 | 57 |
| 1883..... | 18 | 682 | 0 | 152,502 | 87,834 | 225,660 | 2.57 | 58 |
| 1884..... | 19 | 732 | 0 | 108,164 | 62,709 | 156,294 | 2.49 | 58 |
| 1885..... | 13 | 642 | 0 | 68,796 | 39,416 | 109,723 | 2.78 | 57 |
| 1886..... | 15 | 560 | 0 | 59,332 | 34,932 | 94,042 | 2.69 | 59 |
| 1887..... | 15 | 585 | 223 | 164,974 | 93,004 | 245,981 | 2.65 | 56 |
| 1888..... | 15 | 547 | 12 | 124,201 | 67,194 | 166,330 | 2.48 | 54 |
| 1889..... | 13 | 462 | 0 | 132,828 | 75,124 | 188,222 | 2.50 | 56 |
| 1890..... | 13 | 443 | 1 | 126,921 | 74,633 | 218,090 | 2.92 | 59 |
| 1891..... | 9 | 421 | 0 | 69,320 | 38,718 | 76,901 | 1.99 | 56 |
| 1892..... | 10 | 436 | 0 | 95,236 | 51,818 | 112,907 | 2.18 | 54.4 |
| 1893..... | 9 | 435 | 0 | 42,963 | 22,436 | 43,671 | 1.95 | 52 |
| 1894..... | 8 | 363 | 0 | 55,324 | 32,340 | 90,875 | 2.78 | 59 |
| 1895..... | 8 | 377 | 0 | 51,921 | 29,050 | 69,655 | 2.40 | 56 |
| 1896..... | 9 | 431 | 0 | 128,923 | 80,868 | 208,789 | 2.58 | 62.7 |
| 1897..... | 9 | 433 | 0 | 151,545 | 95,087 | 235,784 | 2.48 | 62.7 |

*Cincinnati district.*—All the coke made in this district is from the dust and screenings of the coal yards at Cincinnati and from the coal boats and barges that bring coal from the Upper Ohio, chiefly from the Pittsburg and the Kanawha regions of West Virginia. When the ovens are in operation, some run of mine and slack from Pittsburg mines is used in the North Bend block of ovens, situated on the Ohio River a short distance below Cincinnati.

The statistics of the manufacture of coke in the Cincinnati district from 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in the Cincinnati district, Ohio, from 1880 to 1897.*

| Year. | Establishments. | Ovens, | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 4 | 32 | 0 | 16,141 | 10,326 | $42,255 | $4.09 | 64 |
| 1881 | 4 | 32 | 0 | 20,607 | 13,237 | 54,439 | 4.11 | 64 |
| 1882 | 4 | 32 | 0 | 19,687 | 12,045 | 47,437 | 3.78 | 61 |
| 1883 | 5 | 57 | 0 | 33,978 | 20,106 | 65,990 | 3.28 | 59 |
| 1884 | 5 | 57 | 0 | 32,134 | 18,840 | 61,072 | 3.24 | 59 |
| 1885 | 5 | 82 | 0 | 17,480 | 10,962 | 35,873 | 3.27 | 63 |
| 1886 | 5 | 82 | 0 | 17,015 | 10,566 | 31,633 | 2.99 | 62.1 |
| 1887 | 5 | 150 | 20 | 56,723 | 32,894 | 95,754 | 2.91 | 58 |
| 1888 | 6 | 156 | 12 | 63,217 | 35,868 | 95,618 | 2.67 | 57 |
| 1889 | 5 | 146 | 0 | 75,892 | 45,108 | 120,899 | 2.68 | 59.4 |
| 1890 | 5 | 150 | 0 | 68,266 | 43,278 | 171,848 | 3.97 | 63 |
| 1891 | 3 | 130 | 0 | 13,403 | 9,080 | 31,529 | 3.47 | 67.7 |
| 1892 | 4 | 146 | 0 | 31,330 | 19,320 | 64,319 | 3.33 | 61.3 |
| 1893 | 3 | 142 | 0 | 13,700 | 9,000 | 27,000 | 3.00 | 65.7 |
| 1894 | 3 | 92 | 0 | 42,995 | 26,417 | 81,751 | 3.09 | 61 |
| 1895 | 3 | 92 | 0 | 9,628 | 5,657 | 16,971 | 3.00 | 58.8 |
| 1896 | 3 | 92 | 0 | 16,495 | 10,181 | 31,068 | 3.05 | 61.7 |
| 1897 | 3 | 92 | 0 | 40,200 | 23,532 | 67,079 | 2.85 | 59 |

*Ohio district.*—This district, as noted above, includes all of the ovens coking Ohio coal and the ovens at Leetonia, in Columbiana County, and in the vicinity of Steubenville and Bridgeport, which latter place is opposite Wheeling, West Virginia. It also includes 125 ovens of the Marietta Run Coal and Coke Company and 50 ovens of the Black Diamond Coal and Coke Company in the Federal Valley district.

*Statistics of the manufacture of coke in the Ohio district, Ohio, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 11 | 584 | 25 | 156,312 | 90,270 | $213,650 | $2.37 | 57 |
| 1881 | 11 | 609 | 0 | 180,438 | 106,232 | 243,289 | 2.39 | 59 |
| 1882 | 12 | 615 | 0 | 161,890 | 91,677 | 218,676 | 2.39 | 57 |
| 1883 | 13 | 625 | 0 | 118,524 | 67,728 | 459,670 | 2.36 | 57 |
| 1884 | 14 | 675 | 0 | 76,030 | 43,869 | 95,222 | 2.17 | 58 |
| 1885 | 8 | 560 | 0 | 51,316 | 28,454 | 73,850 | 2.60 | 55 |
| 1886 | 10 | 478 | 0 | 42,317 | 24,366 | 62,409 | 2.56 | 57½ |
| 1887 | 10 | 435 | 203 | 108,251 | 60,110 | 150,227 | 2 50 | 55½ |
| 1888 | 9 | 391 | 0 | 60,984 | 31,326 | 70,712 | 2.25 | 51 |
| 1889 | 8 | 316 | 0 | 56,936 | 30,016 | 67,323 | 2.24 | 52.7 |
| 1890 | 8 | 293 | 1 | 58,655 | 31,335 | 46,242 | 1.47 | 53.4 |
| 1891 | 6 | 291 | 0 | 55,917 | 29,638 | 45,372 | 1.53 | 53 |
| 1892 | 6 | 290 | 0 | 63,906 | 32,498 | 48,588 | 1.50 | 50.9 |
| 1893 | 6 | 293 | 0 | 29,263 | 13,436 | 16,671 | 1.24 | 46 |
| 1894 | 5 | 271 | 0 | 12,329 | 6,223 | 9,124 | 1.466 | 50.5 |
| 1895 | 5 | 285 | 0 | 42,293 | 23,393 | 52,684 | 2.25 | 55.3 |
| 1896 | 6 | 339 | 0 | 112,428 | 70,687 | 177,721 | 2.51 | 62.8 |
| 1897 | 6 | 341 | 0 | 111,345 | 71,555 | 168,705 | 2.36 | 64 |

The character of the coal used in the manufacture of coke in Ohio since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Ohio since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 34,729 | 0 | 54,473 | 37,719 | 126,921 |
| 1891 | 5,200 | 0 | 64,120 | 0 | 69,320 |
| 1892 | 35,334 | 0 | 32,402 | 27,500 | 95,236 |
| 1893 | 0 | 0 | 24,859 | 18,104 | 42,963 |
| 1894 | 0 | 0 | 14,845 | 40,479 | 55,324 |
| 1895 | 28,053 | 0 | 10,868 | 13,000 | 51,921 |
| 1896 | 88,616 | 0 | 24,325 | 15,982 | 128,923 |
| 1897 | 92,192 | 0 | 29,353 | 30,000 | 151,545 |

## PENNSYLVANIA.

The coking districts of Pennsylvania have been so frequently described in previous volumes of Mineral Resources that it is not necessary to enter into any details regarding them. As it is important, however, that the dividing line between these districts should be kept in mind in examining these statistics, the following brief statement as to the territory included in these districts, which has been published in previous reports, is repeated here for the sake of convenience.

The Allegheny Mountain district includes the ovens along the line of the Pennsylvania Railroad from Gallitzin eastward over the crest of the Alleghenies to beyond Altoona. The Allegheny Valley district includes the coke works of Armstrong and Butler counties and one of those in Clarion County, the other ovens in the latter county being included in the Reynoldsville-Walston district. The Beaver district includes the ovens in Beaver County; the Blossburg and Broad Top those in the Blossburg and Broad Top coal fields. The ovens of the Clearfield-Center district are chiefly in the two counties from which it derives its name. The Connellsville district is the well-known region in western Pennsylvania, in Westmoreland and Fayette counties, extending from just south of Latrobe to Fairchance. The Greensburg, Irwin, Pittsburg, and Reynoldsville Walston districts include the ovens near the towns which have given the names to these districts. The Upper Connellsville district, sometimes called the Latrobe district, is near the town of Latrobe.

The production of coke in Pennsylvania in 1897 shows an increase of 1,610,422 tons, or about 22 per cent over the output for 1896. It must be remembered, however, that while the production in 1896 was larger than in either 1893 or 1894, it was more than 2,000,000 tons less than the output in 1895, and was not equal to the usual production under normal trade conditions. During 1893 and 1894 the industry was seriously affected by the panic of the former year and the general depression of prices which prevailed during 1894. In 1895 a temporary boom was experienced in the iron trade, due to the desire of buyers to take advantage of the extremely low prices prevailing during 1894 and the earlier months of 1895, and this boom was reflected in the increased production of coke. Producers in Pennsylvania, particularly those in the Connellsville region, endeavored to make up for the losses experienced in the two preceding years, and the production was pushed until it reached a total of 9,404,215 tons, an increase of 3,340,000 tons, or practically 55 per cent over the output of 1894. Prices for this enormous product, while somewhat improved as compared with those of 1894, were, with the exception of that year, lower than in any year since 1888. In the early part of 1896 the principal producers in the Connellsville region put the price of furnace coke at $2 per ton, with foundry at $2.30 and crushed at $2.35, maintaining

these prices until the end of the year, and while some less important producers sold their furnace coke at $1.75, the average of the region for the year was $1.834, an advance of nearly 50 per cent in the average price over 1896. The result of this was that while the production of coke decreased over 2,000,000 tons in the State, the value of the product increased $1,275,000 over that of 1895. The action of the Connellsville producers in upholding prices in 1896 enabled operators in competitive fields to obtain a footing in markets formerly held by Connellsville coke, and the returns for 1897 show that while the prices for the year were higher than in any year since 1892, with the exception of 1896, no attempt was made to maintain the prices at a sacrifice of the tonnage, and operators directed their efforts to the securing of markets lost in the previous year. As a result the production of the State increased to 8,966,924 tons, and the total value of the product increased from $13,182,859 in 1896 to $13,727,966 in 1897. The average price per ton declined 26 cents, about one-half of the increase in 1896 over 1895. It will be seen from this that while the production in 1897 increased 22 per cent, the value increased only a little more than 4 per cent.

In the following table the statistics are given of the production of coke in Pennsylvania for the years 1880 to 1897:

*Statistics of the manufacture of coke in Pennsylvania from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880.. | 124 | 9,501 | 836 | 4,347,558 | 2,821,384 | $5,255,040 | $1.86 | 65 |
| 1881.. | 132 | 10,881 | 761 | 5,393,503 | 3,437,708 | 5,898,579 | 1.70 | 64 |
| 1882.. | 137 | 12,424 | 642 | 6,149,179 | 3,945,034 | 6,133,698 | 1.55 | 64 |
| 1883.. | 140 | 13,610 | 211 | 6,823,275 | 4,438,464 | 5,410,387 | 1.22 | 65 |
| 1884.. | 145 | 14,285 | 232 | 6,204,604 | 3,822,128 | 4,783,230 | 1.25 | 62 |
| 1885.. | 133 | 14,553 | 317 | 6,178,500 | 3,991,805 | 4,981,656 | 1.25 | 64.6 |
| 1886.. | 108 | 16,314 | 2,558 | 8,290,849 | 5,406,597 | 7,664,023 | 1.42 | 65.2 |
| 1887.. | 151 | 18,294 | 802 | 8,938,438 | 5,832,849 | 10,746,352 | 1.84 | 65.3 |
| 1888.. | 120 | 20,381 | 1,565 | 9,673,097 | 6,545,779 | 8,230,759 | 1.26 | 68 |
| 1889.. | 109 | 22,143 | 567 | 11,581,292 | 7,659,055 | 10,743,492 | 1.40 | 66 |
| 1890.. | 106 | 23,430 | 74 | 13,046,143 | 8,560,245 | 16,333,674 | 1.91 | 65.6 |
| 1891.. | 109 | 25,324 | 11 | 10,588,544 | 6,954,846 | 12,679,826 | 1.82 | 66 |
| 1892.. | 109 | 25,366 | 269 | 12,591,345 | 8,327,612 | 15,015,336 | 1.80 | 66.1 |
| 1893.. | 102 | 25,744 | 19 | 9,386,702 | 6,229,051 | 9,468,036 | 1.52 | 66 |
| 1894.. | 101 | 25,824 | 118 | 9,059,118 | 6,063,777 | 6,585,489 | 1.086 | 66.9 |
| 1895.. | 99 | 26,042 | 170 | 14,211,567 | 9,404,215 | 11,908,162 | 1.266 | 66.2 |
| 1896*a*. | 158 | 26,658 | 154 | 11,124,610 | 7,356,502 | 13,182,859 | 1.792 | 66.1 |
| 1897*a*. | 153 | 26,910 | 307 | 13,538,646 | 8,966,924 | 13,727,966 | 1.53 | 66.2 |

*a* Includes coal used, coke produced, and its value in New York.

The quality of the coal produced in the principal coking regions of Pennsylvania is such that little or no preparation is necessary before charging into the ovens. For this reason it is found that by far the larger portion of the coal used in the manufacture of coke in Pennsylvania is unwashed, generally from 80 to 90 per cent of the coal coked being unwashed run of mine. There was more coal washed in 1897 than in any year since 1891. In 1896 the amount of washed coal, including run of mine and slack, was only 372,474 tons, or about 3.5 per cent of the total. In 1897 the amount of washed coal was 556,576 tons, a little over 4 per cent of the total.

The character of the coal used in the manufacture of coke in Pennsylvania since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Pennsylvania since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 11,788,625 | 303,591 | 630,195 | 323,732 | 13,046,143 |
| 1891 | 9,470,646 | 256,807 | 558,106 | 302,985 | 10,588,544 |
| 1892 | 11,237,253 | 159,698 | 1,059,994 | 134,400 | 12,591,345 |
| 1893 | 8,302,307 | 216,762 | 739,128 | 128,505 | 9,386,702 |
| 1894 | 8,671,534 | 118,279 | 204,811 | 64,494 | 9,059,118 |
| 1895 | 13,618,376 | 34,728 | 440,869 | 117,594 | 14,211,567 |
| 1896 (*a*) | 9,289,089 | 273,082 | 1,463,047 | 99,392 | 11,124,610 |
| 1897 (*a*) | 11,540,459 | 301,052 | 1,441,611 | 255,524 | 13,538,646 |

*a* Includes coal used in New York.

## PRODUCTION OF COKE IN PENNSYLVANIA, BY DISTRICTS.

The following tables are interesting as showing how the high prices set for Connellsville coke in 1896 affected the other coke-producing districts of the State. It will be seen that with the exception of the Blossburg and Broadtop districts the output in every district in 1896 shows an increase over the preceding year, and it appears that with the exception of the Upper Connellsville and the Irwin districts the producers in the districts outside of the Connellsville not only held the ground secured by them in 1896, but improved that advantage with increased production in 1897.

In the following tables will be found the statistics of the production of coke in Pennsylvania, by districts, for the years 1895, 1896, and 1897:

*Coke production in Pennsylvania in 1897, by districts.*

| District. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Average price per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per ct.* |
| Allegheny Mountain | 13 | a 1,185 | 0 | 417,470 | 278,578 | $365,191 | $1.31 | 66.7 |
| Allegheny Valley | 2 | 116 | 0 | 8,300 | 5,000 | 10,000 | 2.00 | 60.2 |
| Beaver | 3 | b 33 | 0 | 42,200 | 27,276 | 61,646 | 2.26 | 64.6 |
| Broadtop | 5 | 491 | 15 | 106,706 | 66,949 | 107,430 | 1.60 | 62.7 |
| Clearfield-Center | 7 | 668 | 0 | 230,395 | 153,517 | 197,139 | 1.28 | 66 |
| Connellsville | 86 | c 18,467 | 92 | 10,243,690 | 6,860,826 | 10,662,428 | 1.55 | 67 |
| Greensburg | 3 | 178 | 0 | 81,927 | 52,495 | 65,619 | 1.25 | 64 |
| Irwin | 5 | 696 | 0 | 207,704 | 136,663 | 189,869 | 1.39 | 65.8 |
| Pittsburg | 9 | d 1,233 | 200 | 832,505 | 548,981 | 864,326 | 1.57 | 66 |
| Reynoldsville-Walston | 6 | e 1,980 | 0 | 810,808 | 491,267 | 759,609 | 1.55 | 60.6 |
| Upper Connellsville | 14 | f 1,863 | 0 | 556,941 | 345,372 | 444,709 | 1.29 | 62 |
| Total | 153 | 26,910 | 307 | 13,538,646 | 8,966,924 | 13,727,966 | 1.53 | 66.2 |

a Includes 60 Otto-Hoffmann ovens. b Includes 25 Semet-Solvay ovens.
c Includes 50 Semet-Solvay ovens. d Includes 240 Otto-Hoffmann ovens.
e Includes production and value of coal and coke in New York.
f Includes 30 Newton-Chambers and 3 Slocum ovens.

*Coke production in Pennsylvania in 1896, by districts.*

| District. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Average price per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per ct.* |
| Allegheny Mountain | 13 | a 1,188 | 0 | 408,827 | 266,473 | $349,373 | $1.31 | 65 |
| Allegheny Valley | 2 | 116 | 0 | 12,445 | 7,467 | 14,934 | 2.00 | 60 |
| Beaver | 3 | b 35 | 0 | 13,845 | 9,004 | 17,200 | 1.91 | 65 |
| Broad Top | 5 | 480 | 0 | 111,145 | 72,175 | 126,306 | 1.75 | 64.9 |
| Clearfield-Center | 7 | 666 | 0 | 183,056 | 118,155 | 164,266 | 1.39 | 64.5 |
| Connellsville | 88 | c 18,347 | 0 | 8,107,536 | 5,462,490 | 10,018,946 | 1.834 | 67.4 |
| Greensburg | 3 | 178 | 0 | 36,963 | 24,642 | 30,928 | 1.255 | 66.7 |
| Irwin | 5 | 669 | 0 | 279,104 | 175,916 | 275,518 | 1.566 | 63 |
| Pittsburg | 11 | 1,264 | d 120 | 583,984 | 368,070 | 941,076 | 2.56 | 63 |
| Reynoldsville-Walston (e) | 7 | 1,852 | 34 | 770,104 | 445,998 | 673,625 | 1.51 | 57.9 |
| Upper Connellsville | 14 | f 1,863 | 0 | 617,601 | 406,112 | 570,687 | 1.405 | 65.7 |
| Total | 158 | 26,658 | 154 | 11,124,610 | 7,356,502 | 13,182,859 | 1.792 | 66.1 |

a Includes 60 Otto-Hoffmann ovens. c Includes 50 Semet-Solvay ovens.
b Includes 25 Semet-Solvay ovens in Mercer County. d Otto-Hoffmann ovens.
e Includes coal used, coke produced, and its value in New York.
f Includes 30 Newton-Chambers and 3 Slocum ovens.

*Coke production in Pennsylvania in 1895, by districts.*

| District. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Average price ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per ct.* |
| Allegheny Mountain | 13 | a 1,233 | 0 | 271,096 | 173,965 | $214,741 | $1.23 | 64 |
| Allegheny Valley | 2 | 116 | 0 | 0 | 0 | 0 | 0 | 0 |
| Beaver | 2 | 8 | 0 | 2,888 | 1,584 | 3,940 | 2.49 | 54.8 |
| Blossburg | 1 | 200 | 0 | 976 | 488 | 1,220 | 2.50 | 50 |
| Broad Top | 5 | 460 | 0 | 133,276 | 85,842 | 150,224 | 1.75 | 64.4 |
| Clearfield-Center | 8 | 695 | 0 | 155,088 | 99,469 | 131,188 | 1.32 | 64 |
| Connellsville | 29 | 18,028 | b 80 | 12,174,597 | 8,181,179 | 10,122,458 | 1.237 | 67.2 |
| Greensburg | 3 | 118 | 0 | 31,300 | 20,309 | 22,340 | 1.10 | 65 |
| Irwin | 5 | 725 | 0 | 166,124 | 103,872 | 105,609 | 1.017 | 62.5 |
| Pittsburg | 9 | 973 | 0 | 452,845 | 232,529 | 547,284 | 2.35 | 51.3 |
| Reynoldsville-Walston | 8 | 1,637 | 0 | 504,092 | 296,820 | 357,266 | 1.20 | 58.9 |
| Upper Connellsville | 14 | 1,849 | c 30 | 319,285 | 208,158 | 251,892 | 1.21 | 65 |
| Total | 99 | 26,042 | 110 | 14,211,567 | 9,404,215 | 11,908,162 | 1.266 | 66.2 |

a Includes 60 Otto-Hoffmann ovens. b Includes 50 Semet-Solvay ovens.
c By-product beehive ovens.

*Connellsville district.*—In considering the statistics of the manufacture of coke in Pennsylvania by districts, the Connellsville region, of course, is preeminently the most important. The output in this region has in every year since 1880, with the exception of 1896, produced more than 50 per cent of the total coke product of the United States. As has before been stated, the decreased production of Connellsville coke in 1896, which for the first time in the history of the region made its product less than 50 per cent of the total, was the determination on the part of the principal producers to uphold prices throughout the year. Connellsville coke could not be bought during any time in 1896 for less than $1.75 per ton, and the larger operators kept the price at $2 for furnace coke, and while the prices were successfully maintained the production decreased over 2,700,000 tons. How this decrease of production in the Connellsville region affected the output of competitive districts, has already been referred to and is more fully discussed in the report for 1896.

The following are the statistics of the manufacture of coke in the Connellsville region from 1880 to 1897:

*Statistics of the manufacture of coke in the Connellsville region, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880.... | 67 | 7,211 | 731 | 3,367,856 | 2,205,946 | $3,948,643 | $1.79 | 65.5 |
| 1881.... | 70 | 8,208 | 654 | 4,018,782 | 2,639,002 | 4,301,573 | 1.63 | 65.7 |
| 1882.... | 72 | 9,283 | 592 | 4,628,736 | 3,043,394 | 4,473,789 | 1.47 | 65.8 |
| 1883.... | 74 | 10,176 | 101 | 5,355,380 | 3,552,402 | 4,049,738 | 1.14 | 66.3 |
| 1884.... | 76 | 10,543 | 200 | 4,829,054 | 3,192,105 | 3,607,078 | 1.13 | 66.1 |
| 1885.... | 68 | 10,471 | 48 | 4,683,831 | 3,096,012 | 3,776,388 | 1.22 | 66.1 |
| 1886.... | 36 | 11,324 | 1,895 | 6,305,460 | 4,180,521 | 5,701,086 | 1.36 | 66.3 |
| 1887.... | 73 | 11,923 | 98 | 6,182,846 | 4,146,989 | 7,437,669 | 1.79 | 67 |
| 1888.... | 38 | 12,818 | 1,320 | 7,191,708 | 4,955,553 | 5,884,081 | 1.19 | 69 |
| 1889.... | 29 | 14,458 | 430 | 8,832,371 | 5,930,428 | 7,974,633 | 1.34 | 67 |
| 1890.... | 28 | 15,865 | 30 | 9,748,449 | 6,464,156 | 11,537,370 | 1.94 | 66.3 |
| 1891.... | 33 | 17,551 | 0 | 7,083,705 | 4,760,665 | 8,903,454 | 1.87 | 67 |
| 1892.... | 31 | 17,309 | 0 | 9,389,549 | 6,329,452 | 11,598,407 | 1.83 | 67.4 |
| 1893.... | 28 | 17,504 | 5 | 7,095,491 | 4,805,623 | 7,141,031 | 1.49 | 67.7 |
| 1894.... | 29 | 17,829 | 0 | 7,656,169 | 5,192,080 | 5,405,691 | 1.04 | 67.8 |
| 1895.... | 29 | 18,028 | *a* 80 | 12,174,597 | 8,181,179 | 10,122,458 | 1.237 | 67.2 |
| 1896.... | 88 | *a*18,347 | 0 | 8,107,536 | 5,462,490 | 10,018,946 | 1.834 | 67.4 |
| 1897.... | 86 | *a*18,467 | 92 | 10,243,690 | 6,860,826 | 10,662,428 | 1.55 | 67 |

*a* Includes 50 Semet-Solvay by-product ovens.

The beehive oven continues to be practically the only style of oven used in the Connellsville region, the only exception in the region being a bank of 50 Semet-Solvay ovens, which were completed in 1895, and which contributed to the product in 1896 and 1897. One of the advantages possessed by the Semet-Solvay ovens in the saving of the by-products from the distillation of the coal is the fact that they can be and are operated continually, the reports in the Connellsville Courier and to the American Manufacturer showing that these ovens were operated seven days in the week throughout the year. The Semet Solvay ovens in the Connellsville district are located in Dunbar, Pennsylvania, and operated by the Dunbar Furnace Company. It is stated that it is the intention of the company to erect 50 additional ovens of the same type. The total number of ovens in existence in the Connellsville region during 1897 was 18,467, a gain of 120 over 1896; and 92 ovens were in course of construction at the end of the year.

The following table, showing the monthly shipments of Connellsville coke during the last four years, has been compiled from the files of the American Manufacturer, of Pittsburg. It should be remembered that the great strike of 1894 and the high prices set for Connellsville coal in 1896 are responsible for the small shipments reported in those years.

*Monthly shipments of coke from the Connellsville region from 1894 to 1897, inclusive.*

| Month. | Cars. | | | |
|---|---|---|---|---|
| | 1894. | 1895. | 1896. | 1897. |
| January | 17,558 | 29,530 | 26,891 | 30,064 |
| February | 20,560 | 31,643 | 31,808 | 25,492 |
| March | 23,216 | 44,384 | 29,992 | 26,226 |
| April | 20,678 | 29,674 | 27,240 | 24,981 |
| May | 3,328 | 32,930 | 33,307 | 30,868 |
| June | 11,518 | 30,507 | 22,263 | 25,204 |
| July | 11,518 | 32,944 | 23,457 | 32,159 |
| August | 23,476 | 41,820 | 22,214 | 33,868 |
| September | 35,841 | 35,568 | 12,815 | 30,187 |
| October | 30,294 | 37,251 | 17,237 | 40,910 |
| November | 30,714 | 47,680 | 16,804 | 33,635 |
| December | 31,774 | 38,885 | 21,238 | 42,482 |
| Total | 260,475 | 432,816 | 285,266 | 376,076 |

It will be seen from the above table that the greatest activity during 1897 was in the month of December, when the shipments aggregated 51,262 cars, nearly as much as the combined shipments in February and March, and more than the combined shipments in March and April. The coke trade during the year, according to the reports to the American Manufacturer, showed at times the greatest activity ever seen in the region. This was not noticeable during the early months of the year, particularly in February, March, and April, but the summer months showed a considerable improvement, and, stimulated by the remarkable activity in the iron industry during the latter part of the year, the last three months were very productive, showing an average of about 41,000 cars each. Prices varied considerably during the year. In the early part of January $1.90 was named as the price for Connellsville furnace coke, but actual sales are reported as being made at much lower figures. Coke sold as low as $1.65 during the month of January, declining during February, March, and April until in May and June it was as low as $1.30, and small sales were reported at $1.25. Toward the close of the year prices were firm and sales of furnace coke for spot shipment were made at $1.65 per ton.

The following table shows how prices were quoted throughout the year:

*Average monthly prices of coke during 1897.*

| Month. | Furnace. | | Foundry. | Crushed. |
|---|---|---|---|---|
| January | $1.75 to | $2.00 | $2.30 | $2.35 |
| February | 1.75 | 2.00 | 2.30 | 2.35 |
| March | 1.50 | 1.75 | 2.30 | 2.35 |
| April | 1.50 | 1.60 | 2.30 | 2.35 |
| May | 1.30 | 1.50 | 1.75 | 1.85 |
| June | | 1.50 | 1.75 | 1.85 |
| July | | 1.50 | 2.30 | 2.30 |
| August | | 1.50 | 2.30 | 2.30 |
| September | 1.40 | 1.50 | 2.30 | 2.30 |
| October | 1.50 | 1.75 | 2.15 | 2.30 |
| November | | 1.75 | 2.15 | 2.30 |
| December | | 1.75 | 2.15 | 2.30 |

How the above compares with the prices for the corresponding months in 1896 may be seen below:

*Average monthly prices of coke during 1896.*

| Month. | Furnace. | | Foundry. | Crushed. |
|---|---|---|---|---|
| January | $1.75 to | $2.00 | $2.30 | $2.35 |
| February | 1.75 | 2.00 | 2.30 | 2.35 |
| March | 1.75 | 2.00 | 2.30 | 2.35 |
| April | 1.75 | 2.00 | 2.30 | 2.35 |
| May | 1.75 | 2.00 | 2.30 | 2.35 |
| June | 1.75 | 2.00 | 2.30 | 2.35 |
| July | 1.75 | 2.00 | 2.30 | 2.35 |
| August | 1.75 | 2.00 | 2.30 | 2.35 |
| September | 1.75 | 2.00 | 2.30 | 2.35 |
| October | 1.75 | 2.00 | 2.30 | 2.35 |
| November | 1.75 | 2.00 | 2.30 | 2.35 |
| December | 1.75 | 2.00 | 2.30 | 2.35 |

The following table gives the ruling and circular prices of blast-furnace coke free on board at the ovens for the past seventeen years:

*Monthly prices of Connellsville blast-furnace coke free on board at ovens.*

| Month. | 1881. | | 1882. | | 1883. | | 1884. | 1885. |
|---|---|---|---|---|---|---|---|---|
| January ..... | $1.50 to | $1.75 | $1.70 to | $1.80 | $1.15 to | $1.20 | $1.00 | $1.10 |
| February .... | 1.50 | 1.75 | 1.70 | 1.80 | 1.10 | 1.20 | 1.00 | 1.10 |
| March ..... | 1.50 | 1.75 | 1.70 | 1.75 | | 1.05 | 1.00 | 1.10 |
| April ..... | 1.60 | 1.75 | 1.70 | 1.75 | | 1.05 | 1.10 | 1.20 |
| May ..... | 1.60 | 1.65 | 1.65 | 1.70 | .95 | 1.05 | 1.10 | 1.20 |
| June..... | 1.60 | 1.65 | 1.50 | 1.65 | | .90 | 1.10 | 1.20 |
| July ..... | 1.50 | 1.60 | 1.35 | 1.50 | | .90 | 1.10 | 1.20 |
| August..... | | 1.60 | | 1.35 | | .90 | 1.10 | 1.20 |
| September ... | | 1.60 | 1.25 | 1.35 | | 1.00 | 1.10 | 1.20 |
| October..... | 1.60 | 1.65 | | 1.25 | | 1.00 | 1.10 | 1.20 |
| November.... | 1.60 | 1.65 | 1.25 | 1.35 | | 1.00 | 1.10 | 1.20 |
| December.... | 1.60 | 1.70 | 1.15 | 1.35 | | 1.00 | 1.10 | 1.20 |

| Month. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. |
|---|---|---|---|---|---|---|
| January ..... | $1.20 | $1.50 | $1.75 | $1.25 | $1.75 | $1.90 |
| February .... | 1.20 | 2.00 | 1.75 | 1.25 | 1.75 | 1.90 |
| March ..... | 1.35 | 2.00 | $1.25 to 1.50 | 1.25 | 2.15 | 1.90 |
| April ..... | 1.35 | 2.00 | 1.00 | 1.15 | 2.15 | 1.90 |
| May ..... | 1.50 | 2.00 | 1.00 | 1.10 | 2.15 | 1.90 |
| June..... | 1.50 | 2.00 | 1.00 | 1.10 | 2.15 | 1.90 |
| July ..... | 1.50 | 2.00 | 1.00 | $1.00 to 1.10 | 2.15 | 1.90 |
| August ..... | 1.50 | 2.00 | 1.00 | 1.10 | 2.15 | 1.90 |
| September ... | 1.50 | 2.00 | 1.00 | 1.25 1.50 | 2.15 | 1.85 |
| October..... | 1.50 | 2.00 | 1.00 | 1.50 | 2.15 | 1.85 |
| November.... | 1.50 | 2.00 | 1.25 | 1.75 | 2.15 | 1.80 |
| December.... | 1.50 | 2.00 | 1.25 | 1.75 | 2.15 | 1.80 |

| Month. | 1892. | 1893. | 1894. | 1895. | 1896. | | 1897. | |
|---|---|---|---|---|---|---|---|---|
| January ..... | $1.90 | $1.90 | $0.95 to $1.00 | $1.00 | $1.75 to | $2.00 | $1.75 to | $2.00 |
| February .... | 1.90 | 1.90 | .95 | 1.00 | 1.75 | 2.00 | 1.75 | 2.00 |
| March ..... | 1.90 | 1.90 | 1.00 | 1.00 | 1.75 | 2.00 | 1.50 | 1.75 |
| April ..... | 1.90 | 1.70 | .92 | 1.35 | 1.75 | 2.00 | 1.50 | 1.60 |
| May ..... | 1.80 | 1.60 | .92 | 1.35 | 1.75 | 2.00 | 1.30 | 1.50 |
| June..... | 1.80 | 1.50 | 1.00 | 1.35 | 1.75 | 2.00 | | 1.50 |
| July ..... | 1.75 | 1.45 | 1.00 | 1.35 | 1.75 | 2.00 | | 1.50 |
| August..... | 1.75 | 1.25 | 1.15 2.00 | 1.35 | 1.75 | 2.00 | | 1.50 |
| September ... | 1.75 | 1.20 | 1.30 1.40 | 1.35 | 1.75 | 2.00 | 1.40 | 1.50 |
| October..... | 1.75 | 1.20 | 1.00 | 1.60 | 1.75 | 2.00 | 1.50 | 1.75 |
| November.... | 1.75 | 1.10 | 1.01 | 1.60 | 1.75 | 2.00 | | 1.75 |
| December.... | 1.75 | 1.05 | 1.00 | 1.60 | 1.75 | 2.00 | | 1.75 |

*Upper Connellsville district.*—The Upper Connellsville district includes that portion of the Connellsville trough or basin lying north of a point a short distance below Latrobe. The coal differs somewhat from that of the lower part of the basin, so that, in addition to its geographical position, there is another reason for the separation of the production of this field from that of the Connellsville field proper. The Upper Connellsville region contains 1,863 ovens, distributed among 14 establishments. Of these, 4 establishments, embracing 259 ovens, did not make coke in 1897, so that the output for the year was furnished by 10 establishments having a total of 1,604 ovens. The producing ovens in 1897 included a bank of 30 Newton-Chambers by-product beehive ovens, completed in 1896, at Latrobe. The idle ovens included three Slocum ovens at Bolivar.

Production of coke in this district in the last five years has not been up to the record made from 1886 to 1892, inclusive, when it exceeded 400,000 tons in each of the seven years, and averaged 493,000 tons per year. The product in 1896 amounted to 406,112 tons, but did not reach the figure attained in any of the seven years from 1886 to 1892, and in 1897 fell off to 345,372 short tons. In both 1896 and 1897, however, the product was more than in any of the three years immediately preceding.

The following are the statistics of the manufacture of coke in the Upper Connellsville region for the years 1880 to 1897:

*Statistics of the manufacture of coke in the Upper Connellsville district from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 8 | 757 | 0 | 319,927 | 229,433 | $397,945 | $1.73 | 70 |
| 1881..... | 10 | 986 | 0 | 588,924 | 343,728 | 548,362 | 1.60 | 58 |
| 1882..... | 11 | 1,118 | 0 | 650,174 | 375,918 | 536,503 | 1.43 | 58 |
| 1883..... | 11 | 1,118 | 0 | 668,882 | 389,053 | 422,174 | 1.08 | 58 |
| 1884..... | 11 | 1,118 | 0 | 496,894 | 294,477 | 311,665 | 1.06 | 59 |
| 1885..... | 11 | 1,168 | 40 | 555,735 | 319,297 | 346,168 | 1.08 | 57 |
| 1886..... | 12 | 1,337 | 29 | 691,331 | 442,968 | 572,073 | 1.29 | 64.1 |
| 1887..... | 16 | 1,442 | 87 | 717,274 | 470,233 | 840,144 | 1.79 | 65.6 |
| 1888..... | 16 | 1,977 | 0 | 657,966 | 441,966 | 617,189 | 1.40 | 68 |
| 1889..... | 13 | 1,568 | 80 | 635,220 | 417,263 | 609,828 | 1.46 | 65.6 |
| 1890..... | 14 | 1,569 | 28 | 889,277 | 577,246 | 1,008,102 | 1.75 | 64.9 |
| 1891..... | 14 | 1,724 | 0 | 1,000,184 | 649,316 | 1,111,056 | 1.71 | 65 |
| 1892..... | 14 | 1,843 | 0 | 706,171 | 451,975 | 691,323 | 1.53 | 64 |
| 1893..... | 14 | 1,843 | 0 | 499,809 | 320,793 | 447,090 | 1.39 | 64 |
| 1894..... | 14 | 1,843 | 0 | 279,971 | 176,799 | 212,595 | 1.20 | 63 |
| 1895..... | 14 | 1,849 | *a* 30 | 319,285 | 208,158 | 251,892 | 1.21 | 65 |
| 1896 ..... | 14 | *b* 1,863 | 0 | 617,601 | 406,112 | 570,687 | 1.405 | 65.7 |
| 1897..... | 14 | *b* 1,863 | 0 | 556,941 | 345,372 | 444,709 | 1.29 | 62 |

*a* By-product beehive ovens. *b* Includes 33 by-product ovens.

*Allegheny Mountain district.*—In this district are included all the ovens along the line of the Pennsylvania Railroad east of Blairsville and those in Somerset County. This district, like the other prominent ones in the State, profited by the higher prices of Connellsville coke in 1896; but, unlike the Upper Connellsville district, the Allegheny Mountain region not only held its own in 1897 but increased its production nearly 5 per cent over that of 1896. In another respect, however, it is like the Upper Connellsville, in that the production in each of the last five years has been less than that of any year from 1887 to 1892, inclusive.

There are thirteen establishments in the district, with a total of 1,185 ovens. Of these, four establishments, having 180 ovens, were nonproductive. The productive ovens included one bank of 60 Otto-Hoffmann by-product ovens at Johnstown. Five establishments used unwashed run-of-mine coal, three used unwashed slack, and one works used washed slack.

The statistics of the manufacture of coke in the Allegheny Mountain district from 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in the Allegheny Mountain district of Pennsylvania from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 8 | 291 | 0 | 201,345 | 127,525 | $289,929 | $2.27 | 63 |
| 1881..... | 9 | 371 | 0 | 225,563 | 144,430 | 329,198 | 2.28 | 64 |
| 1882..... | 10 | 481 | 0 | 284,544 | 179,580 | 377,286 | 2.10 | 63 |
| 1883..... | 10 | 532 | 0 | 200,343 | 135,342 | 240,641 | 1.78 | 68 |
| 1884..... | 12 | 614 | 0 | 241,459 | 156,290 | 203,213 | 1.30 | 65 |
| 1885..... | 11 | 523 | 82 | 327,666 | 212,242 | 286,539 | 1.30 | 65 |
| 1886..... | 10 | 579 | 14 | 351,070 | 227,369 | 374,013 | 1.64 | 64.8 |
| 1887..... | 10 | 694 | 150 | 461,922 | 297,724 | 671,437 | 2.25 | 64.4 |
| 1888..... | 12 | 950 | 145 | 521,047 | 335,689 | 479,845 | 1.43 | 64.4 |
| 1889..... | 16 | 1,069 | 20 | 564,112 | 354,288 | 601,964 | 1.69 | 63.5 |
| 1890..... | 16 | 1,171 | 0 | 633,974 | 402,514 | 730,048 | 1.81 | 63.5 |
| 1891..... | 16 | 1,201 | 0 | 708,523 | 448,067 | 782,175 | 1.75 | 63 |
| 1892..... | 16 | 1,260 | 0 | 724,903 | 448,522 | 775,927 | 1.73 | 61.9 |
| 1893..... | 15 | 1,260 | 0 | 275,865 | 173,131 | 264,292 | 1.53 | 62.8 |
| 1894..... | 15 | 1,253 | 0 | 92,965 | 58,823 | 71,161 | 1.21 | 63.3 |
| 1895..... | 13 | 1,233 | 60 | 271,096 | 173,965 | 214,741 | 1.23 | 64 |
| 1896..... | 13 | *a* 1,188 | 0 | 408,827 | 266,473 | 349,373 | 1.31 | 65 |
| 1897..... | 13 | *a* 1,185 | 0 | 417,470 | 278,578 | 365,191 | 1.31 | 66.7 |

*a* Includes 60 Otto-Hoffmann ovens.

*Clearfield-Center district.*—This district includes the ovens in Clearfield and Center counties, including Snow Shoe, Moshannon, and other well-known coal districts. There are 7 establishments in this district, 4 of which made coke in 1897, leaving 3 idle. The total number of ovens in the district is 668; the active ones in 1897 numbered 388, making 280 idle, and distributing the active and idle ovens in nearly equal proportions according to the establishments. The output of the district in 1897 was the largest in six years, and, with two exceptions, the largest in the history of the region. Formerly the ovens of this district depended chiefly upon the slack coal produced at the mines in the vicinity, but the supply was uncertain and unsatisfactory. The fact that all of the coal used in 1897 was unwashed run of mine indicates that the industry has been placed upon an independent basis.

The statistics of the manufacture of coke in the Clearfield-Center district for the years 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in the Clearfield-Center district, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *er cent.* |
| 1880..... | 1 | 0 | 0 | 200 | 100 | $200 | $2.00 | 50 |
| 1881..... | 2 | 50 | 0 | 20,025 | 13,350 | 22,695 | 1.70 | 67 |
| 1882..... | 1 | 50 | 0 | 25,000 | 17,160 | 27,406 | 1.60 | 69 |
| 1883..... | 1 | 60 | 0 | 26,500 | 18,696 | 28,844 | 1.50 | 71 |
| 1884..... | 1 | 60 | 0 | 33,000 | 23,431 | 32,849 | 1.40 | 71 |
| 1885..... | 2 | 245 | 0 | 69,720 | 48,103 | 70,331 | 1.46 | 69 |
| 1886..... | 3 | 299 | 20 | 84,870 | 55,810 | 94,877 | 1.70 | 66 |
| 1887..... | 6 | 523 | 10 | 154,566 | 97,852 | 198,095 | 2.02 | 63.3 |
| 1888..... | 6 | 601 | 0 | 172,999 | 115,338 | 174,220 | 1.51 | 66.6 |
| 1889..... | 6 | 671 | 0 | 195,473 | 120,734 | 215,112 | 1.78 | 61.7 |
| 1890..... | 7 | 701 | 0 | 331,104 | 212,286 | 391,957 | 1.85 | 64 |
| 1891..... | 7 | 666 | 0 | 293,542 | 183,911 | 339,082 | 1.84 | 63 |
| 1892..... | 7 | 731 | 0 | 231,357 | 147,819 | 264,422 | 1.79 | 63.9 |
| 1893..... | 8 | 695 | 0 | 155,119 | 98,650 | 171,482 | 1.74 | 63.6 |
| 1894..... | 8 | 694 | 0 | 61,428 | 38,825 | 51,482 | 1.33 | 63 |
| 1895..... | 8 | 695 | 0 | 155,088 | 99,469 | 131,188 | 1.32 | 64 |
| 1896..... | 7 | 666 | 0 | 183,056 | 118,155 | 164,266 | 1.39 | 64.5 |
| 1897..... | 7 | 668 | 0 | 230,395 | 153,517 | 197,139 | 1.28 | 66 |

*Broad Top district.*—The ovens situated in Bedford and Huntingdon counties, comprising what is known as the Broad Top coal field, are included in this district. This district was the one exception to the increased production outside of the Connellsville district in 1896, the

output here decreasing 13,667 tons, and a further decrease, 5,226 tons, is observed in the product for 1897. Three out of the five establishments and 248 out of the 491 ovens were idle during the year. This circumstance, taken in connection with the fact that the production in 1897 was only 55 per cent and the average for the last five years less than 60 per cent of the average output in the eleven years from 1882 to 1892, inclusive, seems to indicate that coke making in the Broad Top region is on the decline. All of the coal used at the two productive establishments in 1897 was unwashed run of mine.

The statistics of the manufacture of coke in the Broad Top region from 1880 to 1897 are shown in the following table:

*Statistics of the manufacture of coke in the Broad Top region, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 5 | 188 | 105 | 92,894 | 51,130 | $123,748 | $2.40 | 55 |
| 1881..... | 5 | 188 | 105 | 111,593 | 66,560 | 167,074 | 2.51 | 59 |
| 1882..... | 5 | 293 | 50 | 170,637 | 105,111 | 215,079 | 2.05 | 62 |
| 1883..... | 5 | 343 | 110 | 220,932 | 147,154 | 271,692 | 1.84 | 66 |
| 1884..... | 5 | 453 | 0 | 227,954 | 151,959 | 264,569 | 1.74 | 66 |
| 1885..... | 5 | 537 | 0 | 190,836 | 112,073 | 185,656 | 1.65 | 58 |
| 1886..... | 5 | 562 | 100 | 171,137 | 108,294 | 187,321 | 1.73 | 63.3 |
| 1887..... | 5 | 581 | 0 | 262,730 | 164,535 | 347,061 | 2.11 | 62.6 |
| 1888..... | 5 | 591 | 0 | 196,015 | 119,469 | 286,655 | 2.40 | 61 |
| 1889..... | 5 | 589 | 0 | 152,090 | 91,256 | 186,718 | 2.05 | 60 |
| 1890..... | 5 | 482 | 16 | 247,823 | 157,208 | 314,416 | 2.00 | 63 |
| 1891..... | 5 | 448 | 0 | 146,008 | 90,728 | 197,048 | 2.17 | 62 |
| 1892..... | 5 | 448 | 8 | 185,600 | 117,554 | 216,090 | 1.84 | 63.3 |
| 1893..... | 5 | 456 | 14 | 136,069 | 86,752 | 150,196 | 1.73 | 63.8 |
| 1894..... | 5 | 454 | 14 | 53,216 | 34,089 | 51,815 | 1.52 | 64 |
| 1895..... | 5 | 460 | 0 | 133,276 | 85,812 | 150,224 | 1.75 | 64.4 |
| 1896..... | 5 | 480 | 0 | 111,145 | 72,175 | 126,306 | 1.75 | 64.9 |
| 1897..... | 5 | 491 | 15 | 106,706 | 66,949 | 107,430 | 1.60 | 62.7 |

*Pittsburg district.*—Much of the coal made into coke in the Pittsburg district is slack, usually obtained from the mines along the several pools of the Monongahela River and brought to Pittsburg by barges. Latterly also considerable coal has been brought from the fourth pool of the Monongahela River to Pittsburg for coking. The predictions made in previous reports that the Pittsburg district was destined to assume much greater importance as a coke-producing center has been verified. The prediction was based on the contemplated building of a

large number of by-product ovens along the Monongahela River near Pittsburg. The year 1897 saw 120 Otto-Hoffmann by-product ovens added to the coke-making equipment of this region. These assisted materially in augmenting the output for the year, which was about 50 per cent more than in 1896, two and one-third times the product of 1895, and more than twice the output in any previous year. It is observable, too, that the percentage yield of coal in coke was the highest ever attained, and that with the exception of 1888 and 1894 the selling value per ton of coke was the lowest on record. There were 9 establishments in the district, and a total of 1,353 ovens at the close of 1897. One concern having 19 ovens was idle during the year. Five establishments used unwashed run of mine coal, two used unwashed slack, and one concern used washed slack coal before coking.

The statistics of the manufacture of coke in the Pittsburg district, Pennsylvania, for the years 1880 to 1897 are stated in the following table:

*Statistics of the manufacture of coke in the Pittsburg district, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 21 | 534 | 0 | 194,393 | 105,974 | $254,500 | $2.40 | 55 |
| 1881..... | 21 | 538 | 0 | 178,509 | 96,310 | 206,965 | 2.15 | 54 |
| 1882..... | 21 | 557 | 0 | 114,956 | 64,779 | 134,378 | 2.07 | 56.3 |
| 1883..... | 20 | 542 | 0 | 119,310 | 66,820 | 126,020 | 1.89 | 56 |
| 1884..... | 20 | 535 | 0 | 97,367 | 53,857 | 99,911 | 1.87 | 55 |
| 1885..... | 17 | 416 | 4 | 91,101 | 46,930 | 72,509 | 1.55 | 51.5 |
| 1886..... | 18 | 730 | 0 | 228,874 | 138,646 | 221,617 | 1.88 | 60.6 |
| 1887..... | 20 | 880 | 235 | 366,184 | 177,097 | 315,546 | 1.78 | 48.4 |
| 1888..... | 22 | 980 | 0 | 428,899 | 264,156 | 350,818 | 1.33 | 62 |
| 1889..... | 17 | 600 | 21 | 233,571 | 141,324 | 283,402 | 2.00 | 60.5 |
| 1890..... | 14 | 541 | 0 | 149,230 | 93,984 | 171,465 | 1.82 | 63 |
| 1891..... | 13 | 590 | 11 | 154,054 | 94,160 | 201,458 | 2.14 | 61 |
| 1892..... | 15 | 725 | 261 | 292,357 | 176,365 | 376,613 | 2.14 | 60.3 |
| 1893..... | 10 | 885 | 0 | 357,400 | 216,268 | 438,801 | 2.03 | 60.5 |
| 1894..... | 9 | 779 | 104 | 371,569 | 227,100 | 351,825 | 1.55 | 61 |
| 1895..... | 9 | 973 | 0 | 452,845 | 232,529 | 547,284 | 2.35 | 51.3 |
| 1896..... | 11 | 1,264 | *a* 120 | 583,984 | 368,070 | 941,076 | 2.56 | 63 |
| 1897..... | 9 | *a* 1,233 | 200 | 832,505 | 548,981 | 864,326 | 1.57 | 66 |

*a* Otto-Hoffmann by-product ovens.

*Beaver district.*—The district is an unimportant one, and the industry was on the decline, with spasmodic reactions from 1880 to 1895. The completion of 25 Semet-Solvay ovens in 1896 revived the production somewhat and in 1897 trebled the production of 1896.

The following are the statistics of the manufacture of coke in the Beaver district, Pennsylvania, for the years 1880 to 1897:

*Statistics of the manufacture of coke in the Beaver district, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 5 | 106 | ..... | 8,013 | 4,880 | $10,150 | $2.08 | 61 |
| 1881..... | 5 | 106 | ..... | 6,887 | 4,333 | 9,013 | 2.08 | 63 |
| 1882..... | 5 | 106 | ..... | 11,699 | 7,960 | 15,124 | 1.90 | 68 |
| 1883..... | 5 | 107 | ..... | 19,510 | 12,395 | 21,062 | 1.70 | 64 |
| 1884..... | 4 | 89 | ..... | 2,250 | 1,390 | 2,168 | 1.56 | 62 |
| 1885..... | 4 | 89 | ..... | 686 | 438 | 696 | 1.59 | 63 |
| 1886..... | 3 | 87 | ..... | 698 | 411 | 646 | 1.57 | 59 |
| 1887..... | 3 | 65 | ..... | 25,207 | 13,818 | 24,137 | 1.75 | 55 |
| 1888..... | 4 | 145 | ..... | 262 | 175 | 260 | 1.48 | 66.6 |
| 1889..... | 3 | 90 | ..... | 3,100 | 1,853 | 3,848 | 2.07 | 60 |
| 1890..... | 3 | 90 | ..... | 4,010 | 2,148 | 4,564 | 2.12 | 53.5 |
| 1891..... | 3 | 88 | ..... | 4,224 | 2,332 | 6,663 | 2.86 | 55 |
| 1892..... | 2 | 10 | 0 | 3,925 | 2,154 | 6,270 | 2.91 | 54.9 |
| 1893..... | 2 | 10 | 0 | 2,998 | 1,644 | 4,446 | 2.70 | 54.8 |
| 1894..... | 2 | 8 | 0 | 2,968 | 1,624 | 4,251 | 2.62 | 54.7 |
| 1895..... | 2 | 8 | 0 | 2,888 | 1,584 | 3,940 | 1.49 | 54.8 |
| 1896..... | 3 | *a* 35 | 0 | 13,845 | 9,004 | 17,200 | 1.91 | 65 |
| 1897..... | 3 | *a* 33 | 0 | 42,200 | 27,276 | 61,646 | 2.26 | 64.6 |

*a* Includes 25 Semet-Solvay ovens in Mercer County.

*Allegheny Valley district.*—This district includes the coke works of Armstrong and Butler counties, situated in the valley of the Allegheny River. There was no coke made in this district in 1894 or 1895, but production was resumed in 1896, with an output of 7,467 tons. The product in 1897 was about two-thirds that of 1896.

The statistics of the manufacture of coke in the Allegheny Valley district for the years 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in the Allegheny Valley district, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 5 | 97 | 0 | 45,355 | 23,470 | $49,068 | $2.10 | 52 |
| 1881..... | 5 | 109 | 0 | 55,676 | 29,650 | 64,664 | 2.18 | 53 |
| 1882..... | 6 | 159 | 0 | 76,000 | 41,897 | 80,294 | 1.92 | 55 |
| 1883..... | 6 | 159 | 0 | 64,810 | 34,868 | 62,982 | 1.81 | 54 |
| 1884..... | 7 | 209 | 0 | 55,110 | 31,430 | 54,859 | 1.75 | 57 |
| 1885..... | 5 | 208 | 0 | 28,630 | 15,326 | 30,151 | 1.97 | 53.5 |
| 1886..... | 5 | 208 | 0 | 51,580 | 28,948 | 44,422 | 1.54 | 56 |
| 1887..... | 5 | 288 | 88 | 77,666 | 44,621 | 84,913 | 1.90 | 57.1 |
| 1888..... | 5 | 376 | 0 | 37,792 | 21,719 | 36,008 | 1.66 | 57.5 |
| 1889..... | 4 | 198 | 0 | 13,105 | 6,569 | 10,538 | 1.62 | 50 |
| 1890..... | 3 | 148 | 0 | 33,049 | 18,733 | 40,204 | 2.15 | 56.7 |
| 1891..... | 3 | 148 | 0 | 21,833 | 11,314 | 25,909 | 2.29 | 52 |
| 1892..... | 3 | 148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1893..... | 2 | 116 | 0 | 10,927 | 6,557 | 11,147 | 1.70 | 60 |
| 1894..... | 2 | 116 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1895..... | 2 | 116 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1896..... | 2 | 116 | 0 | 12,445 | 7,467 | 14,934 | 2.00 | 60 |
| 1897..... | 2 | 116 | 0 | 8,300 | 5,000 | 10,000 | 2.00 | 60.2 |

*Reynoldsville-Walston district.*—This district includes all the ovens on the Rochester and Pittsburg Railroad, as well as those on the Low Grade Division of the Allegheny Valley Railway, and the mines of the New York, Lake Erie and Western Railroad. It is at the present time the third most important coking district in Pennsylvania, and was second in importance in 1895 and 1896, with promise of great increase in production in the future. The production of coke in this district in 1897 (including a small amount made in New York) was the largest in its history. Compared with 1896, the output in 1897 shows an increase of 45,289 tons, or about 25 per cent. There are six establishments in the district, with a total of 1,980 ovens. Three of these establishments were nonproductive in 1897, but the three idle works possessed altogether only 290 ovens, so the possible production was not seriously cut down by their idleness. All of the coal used in making coke is slack, and all of it in 1897 came from the mines in Clearfield and Jefferson counties. About 6 per cent only is washed before coking, there being but one washery (supplying a bank of 100 ovens) in the district.

The following are the statistics of the manufacture of coke in the Reynoldsville-Walston district for the years 1880 to 1897:

*Statistics of the manufacture of coke in the Reynoldsville-Walston district, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 3 | 117 | 0 | 45,055 | 28,090 | $46,359 | $1.65 | 62 |
| 1881..... | 4 | 125 | 2 | 99,489 | 44,260 | 80,785 | 1.85 | 44 |
| 1882..... | 5 | 177 | 0 | 87,314 | 44,709 | 80,339 | 1.80 | 51 |
| 1883..... | 6 | 229 | 0 | 76,580 | 37,044 | 65,584 | 1.77 | 48 |
| 1884..... | 7 | 321 | 0 | 159,151 | 78,646 | 113,155 | 1.44 | 49 |
| 1885..... | 8 | 600 | 143 | 183,806 | 114,409 | 153,795 | 1.35 | 62 |
| 1886..... | 9 | 783 | 500 | 271,037 | 161,828 | 217,834 | 1.35 | 59.7 |
| 1887..... | 11 | 1,492 | 134 | 507,320 | 316,107 | 592,728 | 1.88 | 62.3 |
| 1888..... | 9 | 1,636 | 100 | 404,346 | 253,662 | 320,203 | 1.26 | 62.7 |
| 1889..... | 8 | 1,747 | 0 | 514,461 | 313,011 | 436,857 | 1.40 | 60.8 |
| 1890..... | 8 | 1,737 | 0 | 652,966 | 406,184 | 771,996 | 1.90 | 62 |
| 1891..... | 7 | 1,747 | 0 | 769,100 | 470,479 | 744,098 | 1.58 | 61 |
| 1892..... | 8 | 1,734 | 0 | 683,539 | 425,250 | 743,227 | 1.75 | 62.2 |
| 1893..... | 8 | 1,755 | 0 | 562,033 | 339,314 | 586,212 | 1.73 | 60.4 |
| 1894..... | 8 | 1,755 | 0 | 336,554 | 207,238 | 297,596 | 1.44 | 61.6 |
| 1895..... | 8 | 1,637 | 0 | 504,092 | 296,820 | 357,266 | 1.20 | 58.9 |
| 1896*a* .... | 7 | 1,852 | 34 | 770,104 | 445,998 | 673,625 | 1.51 | 57.9 |
| 1897*a* .... | 6 | 1,980 | 0 | 810,808 | 491,267 | 759,609 | 1.55 | 60.6 |

*a* Includes coal used, coke produced, and its value in New York.

*Blossburg district.*—This district, which was at one time of considerable importance as a coke-producing district, especially to central and western New York, produced very little coke in 1894 and 1895, and none in 1896 or 1897. The ovens have been abandoned.

*Statistics of the manufacture of coke in the Blossburg district, Pennsylvania, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 1 | 200 | 0 | 72,520 | 44,836 | $134,500 | $3.00 | 62 |
| 1881..... | 1 | 200 | 0 | 88,055 | 56,085 | 168,250 | 3.00 | 64 |
| 1882..... | 1 | 200 | 0 | 100,119 | 64,526 | 193,500 | 3.00 | 64 |
| 1883..... | 2 | 344 | 0 | 71,028 | 44,690 | 122,450 | 2.74 | 63 |
| 1884..... | 2 | 344 | 32 | 62,365 | 39,043 | 93,763 | 2.40 | 63 |
| 1885..... | 2 | 296 | 0 | 46,489 | 26,975 | 59,423 | 2.17 | 58 |
| 1886..... | 2 | 405 | 0 | 136,136 | 81,801 | 174,532 | 2.13 | 60 |
| 1887..... | 2 | 406 | 0 | 182,623 | 103,873 | 234,622 | 2.26 | 56.9 |
| 1888..... | 2 | 407 | 0 | 62,063 | 38,052 | 81,400 | 2.14 | 61 |
| 1889..... | 2 | 407 | 0 | 31,806 | 18,422 | 47,765 | 2.59 | 58 |
| 1890..... | 2 | 407 | 0 | 41,785 | 23,196 | 62,804 | 2.71 | 55.5 |
| 1891..... | 2 | 407 | 0 | 46,084 | 24,351 | 66,195 | 2.72 | 53 |
| 1892..... | 2 | 407 | 0 | 30,746 | 16,675 | 45,855 | 2.75 | 54.2 |
| 1893..... | 2 | 407 | 0 | 22,176 | 11,463 | 31,427 | 2.74 | 50.7 |
| 1894..... | 1 | 250 | 0 | 670 | 332 | 896 | 2.70 | 50 |
| 1895..... | 1 | 200 | 0 | 976 | 488 | 1,220 | 2.50 | 50 |
| 1896..... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1897..... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Greensburg district.*—The Greensburg district includes a small number of ovens situated in the Greensburg coal basin, erected chiefly for the utilization of the slack coal. The coal is all from the Pittsburg vein. There are three establishments, having a total of 178 ovens, 60 of which were added in 1896. The result of the addition of the new ovens is shown in the more than doubled output in 1897 as compared with 1896, and the largest product recorded in the district. None of the coal used in this district is washed.

*Statistics of the manufacture of coke in the Greensburg district, Pennsylvania, from 1889 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1889..... | 2 | 50 | 16 | 32,070 | 20,459 | $21,523 | $1.05 | 63.8 |
| 1890..... | 2 | 58 | 0 | 44,000 | 30,261 | 44,290 | 1.46 | 68.7 |
| 1891..... | 2 | 58 | 0 | 38,188 | 22,441 | 36,627 | 1.63 | 59 |
| 1892..... | 2 | 58 | 0 | 15,005 | 9,037 | 13,173 | 1.46 | 60.2 |
| 1893..... | 3 | 88 | 0 | 29,983 | 18,393 | 26,303 | 1.43 | 61 |
| 1894..... | 3 | 118 | 0 | 27,290 | 15,872 | 18,413 | 1.16 | 58.2 |
| 1895..... | 3 | 118 | 0 | 31,300 | 20,309 | 22,340 | 1.10 | 65 |
| 1896..... | 3 | 178 | 0 | 36,963 | 24,642 | 30,928 | 1.255 | 66 |
| 1897..... | 3 | 178 | 0 | 81,927 | 52,495 | 65,619 | 1.25 | 64 |

*Irwin district.*—The Irwin district comprises the ovens situated near the town of that name; also those located in what may be termed the Irwin basin, on the Youghiogheny River. It will be noted that this district is of considerable importance as a coke producer. Most of the coke made in the district is produced by the Carnegie Steel Company, Limited, at Larimer and Douglas, where slack from the gas coal mined in the immediate vicinity is made into coke. The coal coked by the Carnegie Company is washed before it is charged into the ovens. One of the other works uses unwashed slack, and one uses unwashed run of mine. One establishment having 117 ovens was idle in 1897.

The statistics of the manufacture of coke in the Irwin district from 1889 to 1897 are shown in the following table:

*Statistics of the manufacture of coke in the Irwin district, Pennsylvania, from 1889 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1889..... | 4 | 696 | 0 | 373,913 | 243,448 | $351,304 | $1.44 | 65 |
| 1890..... | 4 | 661 | 0 | 270,476 | 172,329 | 256,458 | 1.49 | 63.7 |
| 1891..... | 4 | 696 | 0 | 323,099 | 197,082 | 266,061 | 1.35 | 61 |
| 1892..... | 4 | 696 | 0 | 328,193 | 202,809 | 284,029 | 1.40 | 61.8 |
| 1893..... | 5 | 725 | 0 | 238,832 | 150,463 | 175,609 | 1.30 | 63 |
| 1894..... | 5 | 725 | 0 | 176,318 | 110,995 | 119,764 | 1.08 | 63 |
| 1895..... | 5 | 725 | 0 | 166,124 | 103,872 | 105,609 | 1.017 | 62.5 |
| 1896..... | 5 | 669 | 0 | 279,104 | 175,916 | 275,518 | 1.566 | 63 |
| 1897..... | 5 | 696 | 0 | 207,704 | 136,663 | 189,869 | 1.39 | 65.8 |

## TENNESSEE.

Owing to an increase of 29,567 short tons in 1897 as compared with 1896, and a decrease of 24,277 tons in Colorado's production, Tennessee regained its place as fourth in importance among the coke-producing States. Tennessee and Colorado have been close rivals for fourth place since the former was permanently supplanted in third position by Alabama in 1888. In the ten years from 1888 to 1897, inclusive, Tennessee has held fourth place six times, while Colorado has had the distinction four times. The decreased production in Colorado during 1897 and an increase of about 86,000 tons in Virginia's output, puts the latter State in fifth place, while Colorado dropped to sixth place, for the first time in fifteen years.

With the exception of 1895, the coke production of Tennessee in 1897 was the largest since 1888, and there have been only three years, 1887, 1888, and 1895, when the coke output in the State exceeded that of 1897. The 100 ovens which were under construction at the close of 1896 were completed in 1897, while 13 ovens were abandoned, making the total number of ovens in the State at the close of 1897, 1,948 as compared with 1,861 in 1896. Three establishments, having a total of 170 ovens, did not produce any coke, so that the product was distributed among 1,778 ovens, making the average production per oven 207.6 tons during the year. The 100 new ovens completed in 1897 were built by the State for using the slack coal product of its mines at Petros. The slack is washed before coking.

The following are the statistics of the manufacture of coke in Tennessee for the years 1880 to 1897:

*Statistics of manufacture of coke in Tennessee from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880 | 6 | 656 | 68 | 217,656 | 130,609 | $316,607 | $2.42 | 60 |
| 1881 | 6 | 724 | 84 | 241,644 | 143,853 | 342,585 | 2.38 | 60 |
| 1882 | 8 | 861 | 14 | 313,537 | 187,695 | 472,505 | 2.52 | 60 |
| 1883 | 11 | 992 | 10 | 330,961 | 203,691 | 459,126 | 2.25 | 62 |
| 1884 | a 13 | 1,105 | 175 | 348,295 | 219,723 | 428,870 | 1.95 | 63 |
| 1885 | 12 | 1,387 | 36 | 412,538 | 218,842 | 398,459 | 1.82 | 53 |
| 1886 | 12 | 1,485 | 126 | 621,669 | 368,139 | 687,865 | 1.87 | 59 |
| 1887 | 11 | 1,560 | 165 | 655,857 | 396,979 | 870,900 | 2.19 | 61 |
| 1888 | 11 | 1,634 | 84 | 630,099 | 385,693 | 490,491 | 1.27 | 61 |
| 1889 | 12 | 1,639 | 40 | 626,016 | 359,710 | 731,496 | 2.03 | 57 |
| 1890 | 11 | 1,664 | 292 | 600,387 | 348,728 | 684,116 | 1.96 | 58 |
| 1891 | 11 | 1,995 | 0 | 623,177 | 364,318 | 701,803 | 1.93 | 58 |
| 1892 | 11 | 1,941 | 0 | 600,126 | 354,096 | 724,106 | 2.05 | 59 |
| 1893 | 11 | 1,942 | 0 | 449,511 | 265,777 | 491,523 | 1.85 | 61 |
| 1894 | 11 | 1,860 | 0 | 516,802 | 292,646 | 480,124 | 1.64 | 56.6 |
| 1895 | 12 | 1,903 | 0 | 684,655 | 396,790 | 754,926 | 1.90 | 57.9 |
| 1896 | 15 | 1,861 | 100 | 600,379 | 339,202 | 624,011 | 1.84 | 56.5 |
| 1897 | 15 | 1,948 | 0 | 667,996 | 368,769 | 667,656 | 1.81 | 55 |

a One establishment made coke in pits.

The character of the coal used in the manufacture of coke in Tennessee since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Tennessee since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 255,359 | 0 | 273,028 | 72,000 | 600,387 |
| 1891 | 184,556 | 0 | 377,914 | 60,707 | 623,177 |
| 1892 | 176,453 | 15,000 | 367,827 | 40,846 | 600,126 |
| 1893 | 179,126 | 0 | 137,483 | 132,902 | 449,511 |
| 1894 | 166,990 | 61,841 | 149,958 | 138,013 | 516,802 |
| 1895 | 96,744 | 59,284 | 285,906 | 242,721 | 684,655 |
| 1896 | 0 | 206,319 | 219,231 | 174,829 | 600,379 |
| 1897 | 36,485 | 400,166 | 119,755 | 111,590 | 667,996 |

## TEXAS.

Texas appears for the first time as a producer of coke upon a commercial scale. Twenty ovens have been erected by the Texas and Pacific Coal Company for utilizing the slack coal produced at its mine. The company has expended considerable money in experimenting, the greatest difficulty encountered being in the efforts to secure a washing plant that would successfully wash the coal. The product in 1897 was small, amounting to but 394 short tons, but it shows that the enterprise of the company has demonstrated the practicability of making coke from Texas coal.

## UTAH.

As there is but one establishment making coke in Utah, detailed statistics of production have been included with that of Colorado, as the coals in this State are practically identical in character with those of western Colorado.

The following is the amount of coke produced in Utah from 1889 to 1897:

*Production of coke in Utah from 1889 to 1897.*

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1889 | 761 | 1894 | 16,056 |
| 1890 | 8,528 | 1895 | 22,519 |
| 1891 | 7,949 | 1896 | 20,447 |
| 1892 | 7,309 | 1897 | 23,617 |
| 1893 | 16,005 | | |

## VIRGINIA.

Coke-making in Virginia from Virginia coal may be said to have begun in 1895, when coke produced in Wise County, on the Clinch Valley division of the Norfolk and Western Railroad, was placed upon the market. Previous to 1895 there were only two establishments in the State, one of which was at Pocahontas, in the Flat Top coal region, the other at Low Moor, just east of the West Virginia line. The coal for the Pocahontas ovens is drawn from mines which extend beyond the boundary line between Virginia and West Virginia, and much, if not the greater part, of the product belongs of right to the latter State. It has been customary, however, to credit all of the product to Virginia, as the openings are in that State. The ovens at Low Moor are fed entirely by coal mined in the New River district of West Virginia. The Clinch Valley or Wise County product belongs entirely to Virginia, and over 60 per cent of the coke product of Virginia in 1897 was from this region.

As will be seen in the accompanying tables, the number of ovens increased from 1,138 in 1896 to 1,453 in 1897, all of the new ones being in the Clinch Valley district. The 110 ovens in course of construction on December 31 are also in this district. The Virginia Coal and Iron Company at Stonega had 100 of the new ovens building at the close of the year, which, when completed, will make a total of 500 owned by this company. The other 10 ovens were being erected by the Dorchester Coal and Coke Company. When these are added to the ones now in existence in the Clinch Valley the total for the district will be 835, whereas there were none in 1894. The Toms Creek Coal and Coke Company has 215 ovens now in operation.

The attempt to produce coke from the Triassic coal of the Richmond basin does not seem to have met with success, as no coke was made in 1897 at the 4 ovens built there the previous year.

The amount of coal coked in Virginia in 1897 was nearly equally divided between run of mine and slack. All of the former was charged into the ovens without washing. About 21 per cent of the slack used was washed. Until 1896 washing the coal before coking was not practiced in Virginia. In that year a plant was erected by the Toms Creek Coal and Coke Company and 13,584 tons of slack coal were washed. The amount of slack coal washed in 1897 was 61,021 tons.

The following are the statistics of the manufacture of coke in Virginia from 1883 to 1897:

*Statistics of the manufacture of coke in Virginia from 1883 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1883..... | 1 | 200 | 0 | 39,000 | 25,340 | $44,345 | $1.75 | 65 |
| 1884..... | 1 | 200 | 0 | 99,000 | 63,600 | 111,300 | 1.75 | 64.25 |
| 1885..... | 1 | 200 | 0 | 81,899 | 49,139 | 85,993 | 1.75 | 60 |
| 1886..... | 2 | 350 | 100 | 200,018 | 122,352 | 305,880 | 2.50 | 61.2 |
| 1887..... | 2 | 350 | 300 | 235,841 | 166,947 | 417,368 | 2.50 | 70.8 |
| 1888..... | 2 | 550 | 0 | 230,529 | 140,199 | 260,000 | 1.74 | 64.7 |
| 1889..... | 2 | 550 | 250 | 238,793 | 146,528 | 325,861 | 2.22 | 61 |
| 1890..... | 2 | 550 | 250 | 251,683 | 165,847 | 278,724 | 1.68 | 66 |
| 1891..... | 2 | 550 | 250 | 285,113 | 167,516 | 265,107 | 1.58 | 58.8 |
| 1892..... | 2 | 594 | 206 | 226,517 | 147,912 | 322,486 | 2.18 | 65.3 |
| 1893..... | 2 | 594 | 206 | 194,059 | 125,092 | 282,898 | 2.26 | 64.5 |
| 1894..... | 2 | 736 | 100 | 280,524 | 180,091 | 295,747 | 1.64 | 64.2 |
| 1895..... | 5 | 832 | 350 | 410,737 | 244,738 | 322,564 | 1.32 | 59.6 |
| 1896..... | 7 | 1,138 | 101 | 454,964 | 268,081 | 404,573 | 1.509 | 58.9 |
| 1897..... | 6 | 1,453 | 110 | 574,542 | 354,067 | 495,864 | 1.40 | 61.6 |

The character of the coal used in the manufacture of coke in Virginia since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Virginia since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890..... | 98,215 | 0 | 153,468 | 0 | 251,683 |
| 1891..... | 107,498 | 0 | 177,615 | 0 | 285,113 |
| 1892..... | 106,010 | 0 | 120,507 | 0 | 226,517 |
| 1893..... | 107,498 | 0 | 86,561 | 0 | 194,059 |
| 1894..... | 103,874 | 0 | 176,650 | 0 | 280,524 |
| 1895..... | 114,802 | 0 | 295,935 | 0 | 410,737 |
| 1896..... | 70,756 | 0 | 370,624 | 13,584 | 454,964 |
| 1897..... | 286,158 | 0 | 227,363 | 61,021 | 574,542 |

## WASHINGTON.

There are only three coke-making establishments in Washington, and but two of these have been in operation during the last three years. These are the only coking plants on the Pacific coast. The coals of Washington, like those of the Rocky Mountain States, are of Cretaceous origin, and in some places still preserve lignitic characteristics. In other places they have been altered by local conditions and are true coking coals. From 1891 to 1895 most of the coal coked in Washington was washed slack. In 1896, however, more than half of the coal used was washed run of mine, and in 1897 all of the coke was made from washed run-of-mine coal.

The product in 1897, while not large when compared with that of some of the coke-producing States, exceeded that of any other year in the history of the State.

Coke making began in Washington in 1884, with a product of 400 short tons. The statistics of production since that time are exhibited in the following table:

*Statistics of the production of coke in Washington from 1884 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1884..... | 1 | 0 | 0 | 700 | 400 | $1,900 | $4.75 | 57.5 |
| 1885..... | 1 | 2 | 0 | 544 | 311 | 1,477 | 4.75 | 57 |
| 1886..... | 1 | 11 | 21 | 1,400 | 825 | 4,125 | 5.00 | 58.9 |
| 1887..... | 1 | 30 | 0 | 22,500 | 14,625 | 102,375 | 7.00 | 65 |
| 1888..... | 3 | 30 | 100 | 0 | 0 | 0 | 0 | 0 |
| 1889..... | 1 | 30 | 0 | 6,983 | 3,841 | 30,728 | 8.00 | 55 |
| 1890..... | 2 | 30 | 80 | 9,120 | 5,837 | 46,696 | 8.00 | 64 |
| 1891..... | 2 | 80 | 0 | 10,000 | 6,000 | 42,000 | 7.00 | 60 |
| 1892..... | 3 | 84 | 30 | 12,372 | 7,177 | 50,446 | 7.03 | 58 |
| 1893..... | 3 | 84 | 0 | 11,374 | 6,731 | 34,207 | 5.08 | 59 |
| 1894..... | 3 | 84 | 0 | 8,563 | 5,245 | 18,249 | 3.48 | 61.2 |
| 1895..... | 3 | 110 | 0 | 22,973 | 15,129 | 64,632 | 4.27 | 65.9 |
| 1896..... | 3 | 120 | 0 | 38,685 | 25,949 | 104,894 | 4.04 | 67 |
| 1897..... | 3 | 120 | 0 | 39,124 | 26,189 | 115,754 | 4.42 | 67 |

The character of the coal used in the manufacture of coke in Washington since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Washington since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 0 | 9,120 | 0 | 0 | 9,120 |
| 1891 | 0 | 0 | 10,000 | 0 | 10,000 |
| 1892 | 0 | 0 | 0 | 12,372 | 12,372 |
| 1893 | 0 | 10,974 | 0 | 405 | 11,379 |
| 1894 | 0 | 0 | 0 | 8,563 | 8,563 |
| 1895 | 0 | 0 | 0 | 22,973 | 22,973 |
| 1896 | 0 | 20,967 | 0 | 17,718 | 38,685 |
| 1897 | 0 | 39,124 | 0 | 0 | 39,124 |

## WEST VIRGINIA.

West Virginia, in spite of a decrease of over 177,000 tons in the production of coke during 1897, as compared with the preceding year, continues in second place among the coke-producing States, a position she has held nine times during the last eighteen years. In the other nine years West Virginia occupied third place eight times and fourth place once. In each case Alabama was the successful competitor for second place, while in 1886, when West Virginia dropped for the first and only time to fourth place, Tennessee took third place.

The coking regions of West Virginia have been separated by the late Joseph D. Weeks into five distinct districts, and the nomenclature adopted by Mr. Weeks has become generally recognized, viz, the Kanawha, the New River, the Flat Top, the Upper Monongahela, and the Upper Potomac. The first two are compact and continuous. They include the ovens along the line of the Chesapeake and Ohio Railroad from west of Low Moor, in Virginia, to the Kanawha Valley. The Flat Top region includes the ovens in what is sometimes called the Pocahontas district. The fourth district, the Upper Monongahela or Northern, is a scattered one, including the ovens in Preston, Taylor, Harrison, and Marion counties, on the upper waters of the Monongahela. The district which has been termed the Upper Potomac includes the coke ovens in the Elk Garden and Upper Potomac fields. These districts have been so frequently described that it is not necessary to repeat the description at this point, but those interested are referred to previous volumes of Mineral Resources.

The following table exhibits the statistics of coke production in West Virginia since 1880:

*Statistics of the manufacture of coke in West Virginia from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 18 | 631 | 40 | 230,758 | 138,755 | $318,797 | $2.30 | 60 |
| 1881..... | 19 | 689 | 0 | 304,823 | 187,126 | 429,571 | 2.30 | 61 |
| 1882..... | 22 | 878 | 0 | 366,653 | 230,398 | 520,437 | 2.26 | 63 |
| 1883..... | 24 | 962 | 9 | 411,159 | 257,519 | 563,490 | 2.19 | 63 |
| 1884..... | 27 | 1,005 | 127 | 385,588 | 223,472 | 425,952 | 1.91 | 62 |
| 1885..... | 27 | 978 | 63 | 415,533 | 260,571 | 485,588 | 1.86 | 63 |
| 1886..... | 29 | 1,100 | 317 | 425,002 | 264,158 | 513,843 | 1.94 | 62 |
| 1887..... | 39 | 2,080 | 742 | 698,327 | 442,031 | 976,732 | 2.21 | 63.3 |
| 1888..... | 51 | 2,764 | 318 | 854,531 | 525,927 | 896,797 | 1.71 | 61.5 |
| 1889..... | 53 | 3,438 | 631 | 1,001,372 | 607,880 | 1,074,177 | 1.76 | 60 |
| 1890..... | 55 | 4,060 | 334 | 1,395,266 | 833,377 | 1,524,746 | 1.83 | 60 |
| 1891..... | 55 | 4,621 | 555 | 1,716,976 | 1,009,051 | 1,845,043 | 1.83 | 58.8 |
| 1892..... | 72 | 5,843 | 978 | 1,709,183 | 1,034,750 | 1,821,965 | 1.76 | 60.5 |
| 1893..... | 75 | 7,354 | 132 | 1,745,757 | 1,062,076 | 1,716,907 | 1.62 | 60.8 |
| 1894..... | 78 | 7,858 | 60 | 1,976,128 | 1,193,933 | 1,639,687 | 1.373 | 60.4 |
| 1895..... | 78 | 7,834 | 55 | 2,087,816 | 1,285,206 | 1,724,239 | 1.34 | 61.6 |
| 1896..... | 84 | 8,351 | 28 | 2,687,104 | 1,649,755 | 2,259,999 | 1.37 | 61.4 |
| 1897..... | 81 | 8,404 | 38 | 2,413,283 | 1,472,666 | 1,933,808 | 1.31 | 61 |

As will be seen from the above table, the record for 1897 shows that year as the second in a period of eighteen years when the production of coke was less than that of the previous year. The decrease in 1897 was not due, however, to any depression in the coke-making industry of the State. West Virginia profited largely in 1896 by the higher prices and consequent decreased production in the Connellsville region of Pennsylvania, and the increase in the output in that year was exceptional, notwithstanding an uninterrupted annual increased production since 1884. Although the output in 1897 was 177,000 short tons less than in 1896, it exceeded that of 1895 by about 187,000 tons, which a glance at the foregoing table will show was according to the normal rate of increase during the last few years.

It will be observed that the average price per ton obtained for the coke product of West Virginia in 1897 was 6 cents lower than that of 1896, and was the lowest price ever reached. This decline may be readily accounted for in the natural endeavors of West Virginia producers to retain the markets secured during 1896, even at a reduction

in price. Under the circumstances the decline is noteworthy only as being so slight.

The greater portion of coal used in the manufacture of coke in West Virginia is slack, 90 per cent or over of which is unwashed. In the Pocahontas region, where 721,000 tons of coke were produced in 1897, none of the coal was washed, and out of 1,172,200 tons of coal used all but 153,500 tons was unwashed slack. In the Kanawha district the coal used was nearly equally divided between slack and run of mine, both unwashed. One establishment on Loup Creek, in the New River district, used washed slack; three works in the district used run of mine, unwashed; and all the rest used unwashed slack. The two works in the Upper Potomac region both used unwashed slack. Washeries were accordingly practically confined to the Upper Monongahela district, where one concern used washed run-of-mine coal and four works used washed slack.

The character of the coal used in the manufacture of coke in West Virginia since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in West Virginia since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890..... | 324,847 | 0 | 930,989 | 139,430 | 1,395,266 |
| 1891..... | 276,259 | 0 | 1,116,060 | 324,657 | 1,716,976 |
| 1892..... | 298,824 | 115,397 | 1,108,353 | 186,609 | 1,709,183 |
| 1893..... | 324,932 | 15,240 | 1,176,656 | 228,929 | 1,745,757 |
| 1894..... | 162,270 | 14,901 | 1,607,735 | 191,222 | 1,976,128 |
| 1895..... | 405,725 | 24,054 | 1,476,003 | 182,034 | 2,087,816 |
| 1896..... | 407,378 | 33,096 | 2,079,237 | 167,393 | 2,687,104 |
| 1897..... | 373,205 | 28,145 | 1,800,528 | 211,405 | 2,413,283 |

## COKE PRODUCTION IN WEST VIRGINIA BY DISTRICTS.

Three of the coke-producing districts of West Virginia are in the southern part of the State and two are in the northern portion. All three of the southern districts, the Flat Top, the New River, and the Kanawha, are drained by the New River, or its western end, the Kanawha. The northern districts, as their names imply, are drained respectively by the headwaters of the Potomac and Monongahela rivers. The Upper Potomac is the only district on the eastern slope of the Allegheny Mountains, and it is the only district in which the product in 1897 exceeded that of 1896. The Flat Top district was the one to profit most by the favorable conditions in 1896, and the product

increased nearly 330,000 tons, or over 60 per cent as compared with 1895. Conversely the Flat Top district suffered the largest decrease in 1897, its product being more than 130,000 tons less than in 1896, and while still nearly 200,000 tons larger than in 1895, was short of the 1894 output by more than 25,000 tons. The New River district, next to the Flat Top, geographically and productively, just about held its own in 1897, the product decreasing only 1,109 tons and being, with the exception of the preceding year, the largest ever recorded. The Kanawha district did not participate in the increased production in 1896, but, on the other hand, lost 7,000 tons, followed in 1897 by a further decrease of 40,000 tons. The Upper Monongahela also lost in both years—34,000 tons in 1896 and 31,000 tons in 1897. Out of 22 establishments in this district and a total of 1,363 ovens, 11 establishments having 379 ovens were idle in 1897. Most of the coke in this district is made in the vicinity of Fairmount, Marion County. The Upper Potomac district has experienced only one year of decreased production since coke making began there in 1887. This was in 1894, the year of general depression following the panic of 1893.

In the following table will be found consolidated the statistics of the production of coke in West Virginia in the three years especially covered by this report, viz, 1895, 1896, and 1897, by districts:

*Production of coke in West Virginia in 1897, by districts.*

| District. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke produced. | Average price of coke per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per ct.* |
| Kanawha .... | 7 | 576 | 20 | 189,312 | 117,849 | $187,359 | $1.59 | 59.1 |
| New River ... | 17 | 1,225 | 0 | 439,103 | 268,263 | 419,151 | 1.56 | 61.1 |
| Flat Top ..... | 36 | 4,648 | 18 | 1,172,206 | 720,988 | 868,484 | 1.21 | 61.5 |
| Upper Monongahela ..... | 22 | 1,363 | 0 | 289,678 | 175,165 | 180,802 | 1.03 | 60.5 |
| Upper Potomac..... | 2 | 592 | 0 | 312,984 | 190,401 | 278,012 | 1.46 | 60.8 |
| Total .. | 84 | 8,404 | 38 | 2,413,283 | 1,472,666 | 1,933,808 | 1.31 | 61 |

*Production of coke in West Virginia in 1896, by districts.*

| District. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke produced. | Average price of coke, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per cent.* |
| Kanawha .... | 7 | 576 | 10 | 259,715 | 157,741 | $263,210 | $1.67 | 60.7 |
| New River ... | 17 | 1,259 | 0 | 425,219 | 269,372 | 443,072 | 1.64 | 63.3 |
| Flat Top ..... | 36 | 4,648 | 18 | 1,400,369 | 852,120 | 1,100,312 | 1.291 | 60.8 |
| Upper Monongahela ..... | 22 | 1,386 | 0 | 331,526 | 206,429 | 211,272 | 1.023 | 62.3 |
| Upper Potomac..... | 2 | 482 | 0 | 270,275 | 164,093 | 242,133 | 1.476 | 60.7 |
| Total .. | 84 | 8,351 | 28 | 2,687,104 | 1,649,755 | 2,259,999 | 1.37 | 61.4 |

*Production of coke in West Virginia in 1895, by districts.*

| District. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke produced. | Average price of coke, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per cent.* |
| Kanawha .... | 6 | 506 | 0 | 267,520 | 164,729 | $270,879 | $1.64 | 61.6 |
| New River ... | 14 | 978 | 0 | 385,899 | 244,815 | 404,978 | 1.65 | 63.4 |
| Flat Top ..... | 36 | 4,648 | 18 | 858,913 | 524,252 | 656,494 | 1.25 | 61 |
| Upper Monongahela ..... | 20 | 1,260 | 37 | 392,297 | 240,657 | 265,293 | 1.10 | 61.3 |
| Upper Potomac..... | 2 | 442 | 0 | 183,187 | 110,753 | 126,595 | 1.14 | 60.5 |
| Total .. | 78 | 7,834 | 55 | 2,087,816 | 1,285,206 | 1,724,293 | 1.34 | 61.6 |

*Pocahontas-Flat Top district.*—Next to the Connellsville district this is the most important coking region in the United States. Outside of Pennsylvania and Alabama it produces more coke than any other single State, and nearly as much as any two. Like the Connellsville region, it produces a typical blast-furnace coke, and as a steam coal, the coal used has only one rival, the Clearfield coal of Pennsylvania. Flat Top coke is chemically superior to Connellsville, as it is lower in ash, and is regarded by some ironmasters as the equal in physical properties to Connellsville coke. The production of coke in the district in 1896 was exceptional, owing to the higher prices placed on Connellsville coke, while that of 1895 was unusually small, on account of a miners' strike throughout the region. It returned to its normal proportions in 1897. The average price in 1897 was the lowest on record.

*Statistics of the manufacture of coke in the Flat Top district of West Virginia from 1886 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1886..... | 2 | 10 | 38 | 1,075 | 658 | $1,316 | $2.00 | 61.2 |
| 1887..... | 5 | 348 | 642 | 76,274 | 51,071 | 100,738 | 1.97 | 67 |
| 1888..... | 13 | 882 | 200 | 164,818 | 103,947 | 183,938 | 1.77 | 63 |
| 1889..... | 16 | 1,433 | 431 | 387,533 | 240,386 | 405,635 | 1.69 | 64 |
| 1890..... | 17 | 1,584 | 252 | 566,118 | 325,576 | 571,239 | 1.75 | 57.5 |
| 1891..... | 19 | 1,889 | 358 | 537,847 | 312,421 | 545,367 | 1.70 | 58 |
| 1892..... | 30 | 2,848 | 933 | 595,734 | 353,696 | 596,911 | 1.69 | 59.3 |
| 1893..... | 34 | 4,349 | 80 | 746,051 | 451,503 | 713,261 | 1.58 | 60.5 |
| 1894..... | 36 | 4,648 | 18 | 1,229,136 | 746,762 | 989,876 | 1.325 | 60.7 |
| 1895..... | 36 | 4,648 | 18 | 858,913 | 524,252 | 656,494 | 1.25 | 61 |
| 1896..... | 36 | 4,648 | 18 | 1,400,369 | 852,120 | 1,100,312 | 1.291 | 60.8 |
| 1897..... | 36 | 4,648 | 18 | 1,172,206 | 720,988 | 868,484 | 1.21 | 61.5 |

*New River district.*—This district is second in importance to the Flat Top and adjoins it on the west. It includes the ovens along the Chesapeake and Ohio Railroad from Quinnimont to Nuttallburg. The coal makes an excellent coke, which is in good demand, its market being chiefly east of the mountains. The coke made at Lowmoor, Va., really belongs to this district, as the coal is drawn from it.

The district just about held its own in the competition for trade in 1897, the product being 1,109 tons less than in 1896, a difference of less than 0.5 per cent. There are 17 establishments in the district, all of which were in operation in 1897.

The statistics of the manufacture of coke in the New River district from 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in the New River district, West Virginia, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 6 | 468 | 40 | 159,032 | 98,427 | $239,977 | $2.14 | 62 |
| 1881..... | 6 | 499 | 0 | 219,446 | 136,423 | 334,652 | 2.45 | 62 |
| 1882..... | 6 | 518 | 0 | 233,361 | 148,373 | 352,415 | 2.38 | 64 |
| 1883..... | 6 | 546 | 0 | 264,171 | 167,795 | 384,552 | 2.29 | 64 |
| 1884..... | 8 | 547 | 12 | 219,839 | 135,335 | 274,988 | 2.03 | 62 |
| 1885..... | 8 | 519 | 0 | 244,769 | 156,007 | 325,001 | 2.08 | 63.75 |
| 1886..... | 8 | 513 | 5 | 203,621 | 127,006 | 281,778 | 2.22 | 62 |
| 1887..... | 11 | 518 | 50 | 253,373 | 159,836 | 401,164 | 2.51 | 63 |
| 1888..... | 12 | 743 | 0 | 334,695 | 199,831 | 390,182 | 1.95 | 60 |
| 1889..... | 12 | 773 | 0 | 268,185 | 157,186 | 351,132 | 2.23 | 58.6 |
| 1890..... | 12 | 773 | 4 | 275,458 | 174,295 | 377,847 | 2.17 | 63 |
| 1891..... | 13 | 787 | 102 | 309,073 | 193,711 | 426,630 | 2.20 | 63 |
| 1892..... | 14 | 965 | 0 | 315,511 | 196,359 | 429,376 | 2.19 | 62 |
| 1893..... | 13 | 947 | 10 | 281,600 | 178,049 | 355,965 | 2.00 | 63 |
| 1894..... | 14 | 1,089 | 0 | 222,900 | 140,842 | 245,154 | 1.74 | 63.2 |
| 1895..... | 14 | 978 | 0 | 385,899 | 244,815 | 404,978 | 1.65 | 63.4 |
| 1896..... | 17 | 1,259 | 0 | 425,219 | 269,372 | 443,072 | 1.64 | 63.3 |
| 1897..... | 17 | 1,225 | 0 | 439,103 | 268,263 | 419,151 | 1.56 | 61.1 |

*Kanawha district.*—The Kanawha district includes all the ovens along the Kanawha River from its formation by the junction of the New and Gauley Rivers at Gauley to the western limit of the coal fields. There are seven establishments in the district, with a total of 576 ovens, all of which were operated during the year. The largest production recorded in the Kanawha district was in 1895, when the strike in the Flat Top district created a demand for other West Virginia cokes, and the output of this region increased nearly 60 per cent over 1895, and reached a total of 164,729 tons. High-priced Connellsville coke kept the production of this district in 1896 nearly to the figure reached in 1895, but in 1897 the product decreased to 117,849 tons, the smallest, with one exception, in seven years.

The statistics of the manufacture of coke in the Kanawha district from 1880 to 1897 are as follows:

*Statistics of the manufacture of coke in the Kanawha district, West Virginia, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 4 | 18 | 0 | 6,789 | 4,300 | $9,890 | $2.30 | 63.3 |
| 1881..... | 4 | 18 | 0 | 11,516 | 6,900 | 16,905 | 2.45 | 60 |
| 1882..... | 5 | *a* 138 | 0 | 40,782 | 26,170 | 62,808 | 2.40 | 64 |
| 1883..... | 5 | *a* 147 | 0 | 58,735 | 37,970 | 88,090 | 2.32 | 64.6 |
| 1884..... | 6 | *a* 177 | 15 | 60,281 | 39,000 | 76,070 | 1.95 | 64.6 |
| 1885..... | 7 | *b* 181 | 63 | 65,348 | 37,551 | 63,082 | 1.68 | 57 |
| 1886..... | 7 | 302 | 170 | 89,410 | 54,329 | 117,649 | 2.17 | 60.7 |
| 1887..... | 7 | 548 | 0 | 153,784 | 96,721 | 201,418 | 2.08 | 63 |
| 1888..... | 9 | 572 | 8 | 141,641 | 84,052 | 146,837 | 1.75 | 59 |
| 1889..... | 6 | 474 | 0 | 109,466 | 63,678 | 117,340 | 1.84 | 58 |
| 1890..... | 6 | 474 | 0 | 182,340 | 104,076 | 196,583 | 1.89 | 57 |
| 1891..... | 6 | 474 | 0 | 241,427 | 134,715 | 276,420 | 2.05 | 56 |
| 1892..... | 6 | 506 | 0 | 242,627 | 140,641 | 284,174 | 2.02 | 58 |
| 1893..... | 6 | 506 | 0 | 215,108 | 122,241 | 237,308 | 1.94 | 56.8 |
| 1894..... | 6 | 506 | 0 | 176,746 | 104,160 | 181,586 | 1.74 | 58.9 |
| 1895..... | 6 | 506 | 0 | 267,520 | 164,729 | 270,879 | 1.64 | 61.6 |
| 1896..... | 7 | 576 | 10 | 259,715 | 157,741 | 263,210 | 1.67 | 60.7 |
| 1897..... | 7 | 576 | 20 | 199,312 | 117,849 | 187,359 | 1.59 | 59.1 |

*a* Eighty of these ovens are Coppée, the balance beehive.
*b* Sixty of these ovens are Coppée, the balance beehive.

*Upper Monongahela district.*—The Upper Monongahela district includes the ovens in the group of counties lying along the line of the Baltimore and Ohio Railroad, near the headwaters of the Monongahela River—Preston, Taylor, Harrison, and Marion counties. There are 22 establishments in this district, eleven of which did not produce any coke in 1897. The 11 active establishments, however, operate 984 of the 1,363 ovens in the district. Most of the coke is produced in Marion County, near Fairmont, 829 of the 984 active ovens being in that region. Harrison County had 22 ovens making coke in 1897, Monongalia County 50, and Preston County 83. About half the amount of coal used is washed slack, and about 10 per cent is washed run of mine. There are 6 washeries in this district, and only 1 more in the State.

The production in the district in 1897 was, with one exception, the smallest in seven years, as shown in the following table:

*Statistics of the manufacture of coke in the Upper Monongahela district, West Virginia, from 1880 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1880..... | 8 | 145 | 0 | 64,937 | 36,028 | $68,930 | $1.91 | 55 |
| 1881..... | 9 | 172 | 0 | 73,863 | 43,803 | 78,014 | 1.78 | 59 |
| 1882..... | 11 | 222 | 0 | 92,510 | 55,855 | 105,214 | 1.88 | 60 |
| 1883..... | 13 | 269 | 0 | 88,253 | 51,754 | 90,848 | 1.76 | 59 |
| 1884..... | 13 | 281 | 100 | 78,468 | 49,139 | 74,894 | 1.52 | 63 |
| 1885..... | 12 | 278 | 0 | 105,416 | 67,013 | 97,505 | 1.45 | 63.5 |
| 1886..... | 12 | 275 | 104 | 131,896 | 82,165 | 113,100 | 1.38 | 62.3 |
| 1887..... | 15 | 646 | 0 | 211,330 | 132,192 | 268,990 | 2.03 | 62.5 |
| 1888..... | 17 | 567 | 110 | 213,377 | 138,097 | 175,840 | 1.27 | 64.7 |
| 1889..... | 17 | 674 | 200 | 210,083 | 128,685 | 171,511 | 1.33 | 62.5 |
| 1890..... | 18 | 1,051 | 50 | 276,367 | 167,459 | 260,574 | 1.56 | 60 |
| 1891..... | 15 | 1,081 | 56 | 517,615 | 291,605 | 462,677 | 1.58 | 56 |
| 1892..... | 19 | 1,129 | 45 | 441,266 | 265,363 | 390,296 | 1.47 | 60.1 |
| 1893..... | 19 | 1,158 | 42 | 379,506 | 225,676 | 295,123 | 1.31 | 59 |
| 1894..... | 20 | 1,221 | 42 | 280,748 | 158,623 | 179,525 | 1.13 | 56.5 |
| 1895..... | 20 | 1,260 | 37 | 392,297 | 240,657 | 265,293 | 1.10 | 61.3 |
| 1896..... | 22 | 1,386 | 0 | 331,526 | 206,429 | 211,272 | 1.023 | 62.3 |
| 1897..... | 22 | 1,363 | 0 | 289,678 | 175,165 | 180,802 | 1.03 | 60.5 |

*Upper Potomac district.*—In the Upper Potomac district are included the ovens along the line of the West Virginia Central and Pittsburg Railway, running south from near Cumberland, Maryland. This district has been thoroughly described, not only in previous volumes of Mineral Resources, but also in a separate publication by the Survey.

With the exception of 1894, the production of coke in this region has shown a steadily increasing business since operations began in 1887. In this way it has rivaled the record of the State. The decrease in 1894 was due to the depression following the financial panic of 1893. There are only two operators in the district, but the ovens number 592, 16 more than the number owned by seven operators in the Kanawha district, and the average number of ovens to an establishment, the highest in the State, about 2.3 times the average to an establishment in the Flat Top district.

Statistics of the production of coke in the Upper Potomac district of West Virginia are as follows:

*Statistics of the manufacture of coke in the Upper Potomac district of West Virginia from 1887 to 1897.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1887..... | 1 | 20 | 50 | 3,565 | 2,211 | $4,422 | $2.00 | 62 |
| 1888..... | 1 | 28 | 0 | 9,176 | 5,835 | 8,752 | 1.50 | 64 |
| 1889..... | 2 | 84 | 0 | 26,105 | 17,945 | 28,559 | 1.58 | 69 |
| 1890..... | 2 | 178 | 28 | 94,983 | 61,971 | 118,503 | 1.91 | 65 |
| 1891..... | 2 | 390 | 39 | 111,014 | 76,599 | 133,549 | 1.75 | 69 |
| 1892..... | 3 | 395 | 0 | 114,045 | 78,691 | 121,208 | 1.54 | 69 |
| 1893..... | 3 | 394 | 0 | 123,492 | 84,607 | 115,250 | 1.36 | 68.5 |
| 1894..... | 2 | 394 | 0 | 66,598 | 43,546 | 43,546 | 1.00 | 65.4 |
| 1895..... | 2 | 442 | 0 | 183,187 | 110,753 | 126,595 | 1.14 | 60.5 |
| 1896..... | 2 | 482 | 0 | 270,275 | 164,093 | 242,133 | 1.476 | 60.7 |
| 1897..... | 2 | 592 | 0 | 312,984 | 190,401 | 278,012 | 1.46 | 60.8 |

## WISCONSIN.

All the coke made in Wisconsin is from Connellsville (Pennsylvania) coal and the coke is standard Connellsville. Its production, therefore, is not of much interest, except as showing that coal can be carried to a distance and successfully made into coke.

The statistics of the manufacture of coke in Wisconsin from 1888 to 1897 inclusive are as follows:

*Statistics of the manufacture of coke in Wisconsin.*

| Year. | Establishments. | Ovens. | | Coal used. | Coke produced. | Total value of coke at ovens. | Value of coke at ovens, per ton. | Yield of coal in coke. |
|---|---|---|---|---|---|---|---|---|
| | | Built. | Building. | | | | | |
| | | | | *Short tons.* | *Short tons.* | | | *Per cent.* |
| 1888..... | 1 | 50 | ..... | 1,000 | 500 | $1,500 | $3.00 | 50 |
| 1889..... | 1 | 50 | ..... | 25,616 | 16,016 | 92,092 | 5.75 | 62.5 |
| 1890..... | 1 | 70 | ..... | 38,425 | 24,976 | 143,612 | 5.75 | 65 |
| 1891..... | 1 | 120 | 0 | 52,904 | 34,387 | 192,804 | 5.61 | 65 |
| 1892..... | 1 | 120 | 0 | 54,300 | 33,800 | 185,900 | 5.50 | 62.2 |
| 1893..... | 1 | 120 | 0 | 24,085 | 14,958 | 95,851 | 6.41 | 62 |
| 1894..... | 1 | 120 | 0 | 6,343 | 4,250 | 19,465 | 4.58 | 67 |
| 1895..... | 1 | 120 | 0 | 8,287 | 4,972 | 26,103 | 5.25 | 60 |
| 1896..... | 1 | 120 | 0 | 8,648 | 5,332 | 21,000 | 3.94 | 62 |
| 1897..... | 1 | 120 | 0 | 29,207 | 17,216 | 75,000 | 4.36 | 59 |

The character of the coal used in the manufacture of coke in Wisconsin since 1890 is shown in the following table:

*Character of coal used in the manufacture of coke in Wisconsin since 1890.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1890 | 38,425 | 0 | 0 | 0 | 38,425 |
| 1891 | 52,904 | 0 | 0 | 0 | 52,904 |
| 1892 | 54,300 | 0 | 0 | 0 | 54,300 |
| 1893 | 20,474 | 0 | 3,611 | 0 | 24,085 |
| 1894 | 6,343 | 0 | 0 | 0 | 6,343 |
| 1895 | 8,287 | 0 | 0 | 0 | 8,287 |
| 1896 | 0 | 0 | 5,183 | 3,465 | 8,648 |
| 1897 | 0 | 0 | 0 | 29,207 | 29,207 |

## WYOMING.

There is but one establishment making coke in Wyoming, that of the Cambria Mining Company, located at Cambria, Weston County. This establishment began the manufacture of coke in 1891, but produced no coke in 1892. Manufacture was resumed in 1893 and has increased each year ever since.

All of the coal used in coking is unwashed slack, which does not give as good a result as washed slack. When the latter is used, the coke is of fine texture and very strong. It is dense, and capable of sustaining any weight ordinarily required of coke used, as this is, in silver smelting. As at present produced, however, the coke is very high in ash.

The statistics of the production of coke in Wyoming from 1891 to 1897 inclusive are as follows:

*Statistics of the production of coke in Wyoming from 1891 to 1897.*

| | 1891. | 1892. | 1893. | 1894. | 1895. | 1896. | 1897. |
|---|---|---|---|---|---|---|---|
| Number of establishments | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Number of ovens built | 24 | 24 | 24 | 24 | 74 | 74 | 74 |
| Number of ovens building | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amount of coal used, short tons | 4,470 | 0 | 5,400 | 8,685 | 10,240 | 41,038 | 54,976 |
| Coke produced, short tons | 2,682 | 0 | 2,916 | 4,352 | 4,895 | 19,542 | 24,007 |
| Total value of coke at ovens | $8,046 | 0 | $10,206 | $15,232 | $17,133 | $58,626 | $72,021 |
| Value of coke at ovens, per ton | $3.00 | 0 | $3.50 | *a* $3.50 | $3.50 | $3.00 | $3.00 |
| Yield of coal in coke, per cent | 60 | 0 | 54 | 50 | 47.8 | 47.6 | 43.7 |

*a* Value estimated.

The character of the coal used in the manufacture of coke in Wyoming is shown in the following table:

*Character of coal used in the manufacture of coke in Wyoming since 1891.*

| Year. | Run of mine. | | Slack. | | Total. |
|---|---|---|---|---|---|
| | Unwashed. | Washed. | Unwashed. | Washed. | |
| | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* | *Short tons.* |
| 1891 | 0 | 0 | 4,470 | 0 | 4,470 |
| 1892 | 0 | 0 | 0 | 0 | 0 |
| 1893 | 0 | 0 | 5,400 | 0 | 5,400 |
| 1894 | 0 | 0 | 8,685 | 0 | 8,685 |
| 1895 | 0 | 0 | 10,240 | 0 | 10,240 |
| 1896 | 0 | 0 | 41,038 | 0 | 41,038 |
| 1897 | 0 | 0 | 54,976 | 0 | 54,976 |

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